AN EVALUATION OF COMPONENT

DEPENDENCE IN COST-RISK ANALYSIS

THESIS

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AN EVALUATION OF COMPONENT DEPENDENCE IN COST-RISK ASSESSMENT

THESIS

Presented to the Faculty of the School of Systems and Logistics

of the Air Force Institute of Technology

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Master of Science in Systems Management

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Preface

The purpose of this research effort was to develop a cost-risk assessment method that incorporated the effects of cost dependence among system components. Current cost-risk assessment techniques make limiting assumptions of component cost independence or total component cost dependence, neither of which we felt truly represented system relationships.

The method we developed and tested provides insight into the modelling of component cost dependency and its application to cost-risk assessment. Further research in this area will improve the ability of the Department of Defense to estimate cost-risk and to limit weapon system cost growth.

During the course of this research effort we have had a great deal of help from a number of people. We are grateful for the direction given to us by our thesis advisor, Mr Rich Murphy. His ideas guided us through the entire project. We wish to thank Col Deep of the Business Management Research Center and his staff for their assistance and cooperation. Finally, we wish to thank Cathy Devaney and Sandy Rue for their patience and support throughout the past months.

Philip T. Popovich

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Abstract

This research project developed a cost-risk assessment method that incorporated the effects of cost dependency between components in a system. The method uses program personnel's subjective assessments of component dependency as inputs. A simulation model was developed and employed to test the method under various levels of component dependence strength and direction, estimation error, and system size.

The analysis was accomplished by performing sensitivity analysis on the predictive capabilities of the cost-risk assessing method. Results indicate that the method has strong predictive capability when component size is small and when the direction of the component dependencies is mixed. It was also determined that the use of component dependency assessments produced more realistic total system variances than those produced under the assumption of component cost independence.

AN EVALUATION OF COMPONENT

DEPENDENCE IN COST-RISK ASSESSMENT

I. Introduction

General Issue

The basic economic problem in the world is scarcity. Scarcity in critical human skills, raw materials, products and services characterizes an environment of limited resources. Like all other nations, the United States must operate within its resource constraints. Resource scarcity pervades and influences decisions at all levels of our government and industry.

A Macro View. Productive resources are distributed between the competing demands of the public and private sectors of the United States economy. Furthermore, the sum total of resources available for public and private use is generally considered to be fixed in the short run. Consequently, the Government's share of our nation's scarce resources can only be increased at the expense of private consumption and/or investment. Even when there are unemployed resources available, the utilization of these resources in the public sector may still have a negative impact on the private sector if they are paid for with tax dollars.

Within the public sector, the government must allocate human and material resources to fulfill both national de-

fense and social responsibilities. Increasing our defense capability by producing the B-1B Bomber or the Peacekeeper missile requires either a cutback in the resources allocated to social programs, or a shifting of resources from the private to the public sector. In addition, political decisions in a democratic society cannot deviate substantially from the public will without a loss of public trust. Consequently, the dual constaints of public will and scarcity limits both the quantity of resources allocated to the public sector and their distribution among competing public needs.

Since money is used by free market societies as a medium for valuing resources, the government's allocation of its human and material assets is accomplished through the budget process. The government indicates, through its appropriation of public funds, how it wants resources divided between defense and social programs. The government's responsibility to see that these funds are wisely spent is ingrained in the words of Thomas Paine:

> Public money ought to be touched with the most scrupulous consciousness... It is not the produce of riches only but of the hard earnings of labor and poverty. It is drawn even from the bitterness of want and misery. Not a beggar passes, or perishes in the streets, whose mite is not in that mass [22:1].

As a steward of public funds, the DoD shares the same ethical responsibility common to all government agencies in expending those funds.

Another reason the military establishment must use its

resources effectively and efficiently is to gain and maintain credibility. Since Congress determines what portion of the federal budget is to be appropriated for national defense, Congress must feel confident that DoD's funds are wisely used. The level of DoD appropriations is also indirectly influenced through the attitudes of Congressional constituents. When the public supports defense programs, it is easy for 'pro-defense' legislators to vote their conscience. Even those who traditionally favor social programs will be more compelled to support defense activities in order to maintain favor with their constituencies. For these reasons, the military must maintain a strong public image, based on the efficient use of resources to meet essential goals. To do otherwise would undermine its ability to secure the resources necessary to provide for a strong national defense.

The Micro View. Resource scarcity influences decisions at all levels of government; the Department of Defense is no exception. Resource limitations create controversy concerning the correct combination of programs to maximize our military capability. What is the optimal blend of strategic and tactical forces? Must the purchase of new weapon systems be sacrificed to retain manpower at desired levels? These are but a few examples of trade-off decisions that DoD managers continually make while pursuing our defense goals. Annual Program Objective Memorandum (POM) decisions reflect the internal competition within the DoD for scarce resources.

Resource scarcity critically impacts the way DoD develops and procures its weapon systems. With an emerging emphasis on readiness and maintainability issues, a larger share of future funding will likely be diverted from those who acquire systems to those who operate and maintain them. Even within the acquisition community, there are competing resource demands. Trade-offs are frequently made between the amount of development effort and the number of systems we produce. Lack of adequate funding can often limit development effort, in areas such as test and evaluation, in order to maintain desired production quantities. Another example of resource trade-offs is the 'stretching out' of efficient production schedules to redirect funds to competing programs. These examples clearly indicate that the distribution of scarce resources, a problem at all levels of our economy, forces major trade-offs in the acquisition of weapon systems.

DoD resource trade-offs are couched in an environment of imperfect information. A by-product of this uncertainty is cost growth in weapons acquisition. Cost growth is the increase from the initial program cost estimate to the final program cost (3:105). Clearly, not all cost growth can be viewed in a negative context. Cost-effective specification changes, for example, often enhance weapon system performance beyond the initial design. Likewise, boosting production quantities is also an intentional management decision to increase both cost and defense capability. It would be

naive, however, to imply that all cost growth is controlled or favorable. Most weapon system programs, regardless of their degree of complexity, face a certain amount of risk... unforeseen and possibly unfavorable.

The concept of risk has often been used to denote the probability of an event (4:II-2). In the acquisition envirnment, cost-risk is the probability of achieving some defined program event, in this case, a cost outcome. If the cost exceeds the anticipated outcome a cost overrun results. Conversely, a cost underrun is any program cost which is less than the anticipated outcome.

The consequences of cost overruns are well recognized. The affected program may either be cancelled, delayed or funded. Cancellation results in unanswered defense needs, while delays result in inefficient program execution - often at a higher final cost. Funding a financially-troubled program in order to avoid these consequences may come at the expense of other related defense programs.

Beverly, and others, state that cost-risk has commonly been attributed to three areas: technical risk, schedule risk and estimating risk. Technical risks arise from striving to achieve maximum performance and technological superiority. The 'state-of-the-art' is often advanced beyond its current boundaries. Schedule risk hinges on the ability of the contractor to meet contractual delivery terms with a product of acceptable quality. Estimating risk commonly results from vague early system definition, lack of

sufficient historical data, or inherent fluctuations in the prices of labor and materials. While all three risk areas impact cost, their effect may be somewhat complimentary (2:265). For example, schedule delays may stem from technical failures. They may also result when a program cannot continue due to a lack of funds caused by an inadequate cost estimate. Because of their direct and complimentary effects on cost, this research uses cost-risk in the context of an aggregate measure of technical, schedule and estimating risk. A program cost goal will be viewed as that program cost which balances an accepted level of technical, schedule and estimating risks.

Definitions. The application of risk assessment to defense weapon system acquisition is relatively new; therefore, widespread agreement on common terms and definitions has not yet emerged (14:35-39). One conclusion from a 1981 risk symposium was the need for basic definitions and common classifications (15:175,2). The solidification of terminology should result as the risk assessment discipline matures.

Rowe and Somers categorize risk analysis as diagrammed in Fig. 1.1. They view risk assessment as the estimation of the risks associated with given program alternatives, while risk management is the action taken to reduce these risks. Risk analysis is considered the combination of risk assessment and risk management (13:10).

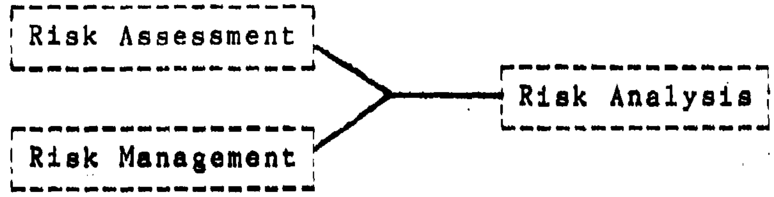

Fig. 1.1 Risk Analysis Taxonomy Adapted from (4:I-3)

This paper accepts that taxonomy, and will focus solely on risk assessment. For further clarification, this paper uses a modified Defense Systems Management College (DSMC) definition of cost-risk assessment, "the mathematical probability of achieving or not achieving acquisition cost... goals" (4:B-5). Identifying the magnitude of the deviation from the cost goal, along with the deviation's probability of occurrence, is an implicit part of the risk assessment process. Implied in this definition is Worm's concept of reasonably efficient and economical practices in the contractor's and government's operation (20:1).

<u>Specific Problem Statement</u>

While program cost estimates are traditionally presented as a single, unique value, the probability of achieving that cost has generally been ignored. Not until recently has there been an emphasis on quantifying cost-risk, yet risk assessment has potential benefits when the magnitude of unfavorable consequences is significant.

Effective cost-risk assessment identifies and helps management focus attention on potential cost problems. The DoD manager may then make better resource allocation decisions in the face of uncertainty by applying risk management to appropriate program areas. Also, budget decisions made with cost-risk as an additional consideration should reflect more accurate program cost goals. Objective identification of adequate contingency funding will also result. Request for these contingencies during the budget process, a concept that the Army is using (8:2), may further DoD long-run credibility by reducing the occurrence of cost overruns.

In order to make better decisions, acquisition personnel need to know the probability of deviating from the program's cost goal or the probability of an outcome falling within a specified range of values. The following information is needed to determine this probability.

1. The shape of the <u>total cost distribution</u> is the underlying statistical distribution for the cost of an entire system. This distribution describes the relative likelihood of each possible cost outcome for the system.

2. The <u>measure of location</u> describes where the mean, median or mode are located on the cost distribution. The mode, or most likely cost outcome is typically the point cost estimate for the program (16:130).

3. The <u>measure of scale</u> indicates the amount of variance in the distribution. A large variance indicates a large dispersion around the mean and, therefore, a greater

potential program cost-risk. A good variance estimate is crucial in cost-risk assessment. While items 1 and 2 are necessary information for cost-risk assessments, they do not impact the thrust of this research.

While this information is sufficient for identifying cost-risk, it is seldom available for the entire system. Current cost-risk techniques divide the system into components, or identifiable activities, which collectively include all required program tasks. System components are typically Work Breakdown Structure (WBS) elements; however, Contract Line Items or other categorizations may be used (16:129). The cost of each system component is estimated separately. Because the shape of the cost distribution for each system component is rarely, if ever, known, analysts make distributional assumptions. The Normal, Beta and Triangular distributions are commonly used (18:195). The variance of each component is determined by estimating the most optimistic, most pessimistic and most-likely cost outcomes. The component variances are then added together to yield a total system cost variance. This allows cost-risk assessments to be made around the total system cost estimate. This process will be discussed more in Chapter 2.

It is the authors' opinion that the methods currently used to assess total system cost-risk are inadequate. Although cost-risk assessment is inherently subjective, cost-risk is also mis-estimated because of invalid assumptions about the relationships between system components. Most

often, components are assumed to be completely independent of each other; that is, cost performance in each system component is not associated with the cost outcomes of other system components. In other words, an increase in the cost of one of the system components does not imply an increase or decrease in the cost of any other system component. Assuming component independence, the cost variance for the total system is simply the sum of the component variances. This simplifying assumption is unrealistic because it understates the system cost variance whenever its component costs have a positive relationship to each other.

The counter-assumption to independence is the assumption that there is maximum positive linear dependency among all system components. With this assumption, the cost variance for the total system can also be expressed entirely in terms of individual component variances. Under this assumption, an increase in the cost of a system component would cause a totally predictable increase in all of the other system components. However, this approach overstates the system cost variance by assuming that the strength of a component's cost influence on all other components is so overwhelming as to be totally predictable. The overstatement of risk occurs because cost changes are assumed to affect components that, in reality would not be affected, could be negatively affected, or have only a weak positive affect. For this reason, assuming maximum positive linear dependency is unrealistic. This will be addressed further

in Chapter 3.

Intuitively, cost-risk dependence among some system component costs exists, but the strength of the relationships will vary between component pairings and should seldom be strong enough to correspond to maximum dependency. Statistical theory exists for identifying total system variance under these conditions. The details will be discussed in Chapter 3. For now, suffice it to say that the total variance is a function of the individual variances and a covariance term for each component pair. Wherever dependency exists between component pairs, the covariance indicates the direction of dependence: positive or negative. A positive covariance between two components indicates that a rise in the cost of one component will be reflected by a rise in the cost of the second component. Similarily, a decrease in the cost of one component will be reflected by a decrease in the cost of the second component. On the other hand, a negative covariance indicates that component costs will tend to move in opposite directions. The strength of the relationship can be determined after a simple scaling procedure.

Current risk assessment techniques do not require an estimate of the covariance among system components. As such, the information that is currently used is insufficient to accurately measure total system cost variance for a program with dependent components. The resulting system cost-risk is inherently distorted.

Research Objective

The purpose of this research is to develop a methodology which produces a more realistic evaluation of cost-risk. Specifically, the goal is to estimate the total system cost variance given the existence of component dependencies.

Current statistical theory provides a solution to the problem. However, the solution requires reasonable estimates of the covariances between component pairs. Historical databases generally provide an inadequate basis for estimating these values, which means that program management personnel or knowledgeable system experts must be called upon to provide subjective measures of dependency. The problem is that these experts seldom, if ever, think about dependencies in terms of covariances. It would be a gross understatement to say that most experts would feel uncomfortable using covariance to describe dependence within a program. The key to solving this problem is to solicite information in terms that relate to the experts frame of reference. Failure to do so may result in receiving no information or information which provides a distorted picture of the expert's true opinion.

The methodology developed in this research must be able to convert this information into covariance estimates that capture the component dependencies implied in the expert's responses. Obviously, the adequacy of the conversion process is critical if the total system cost variance is to adequately reflect the 'real' cost-risk.

Development of this methodology, therefore, requires that the following specific research objectives be met:

1. Develop a methodology to translate subjective inputs into a measure of component dependency with a logical and rational basis.
2. Convert the component dependency measurement and other related cost data into a range-stated estimate.
3. Validate the predictive abilities of this technique.

The methodology to meet these objectives will be detailed in Chapter 3.

II. Literature Review

Purpose

Methodologies for quantifying program cost-risk within DoD are still evolving. Although these methodologies differ somewhat from each other, they follow a common risk assessment approach. The purpose of this chapter is to describe this general risk assessment process through a review of the current literature.

Scope and Limitations

This chapter provides an overview of cost-risk assessment. It does not intend to provide a how-to procedure nor an in-depth explanation of any one risk assessment technique. Instead, it summarizes only the general concept behind risk assessment, with special interest on the more limited problem of determining the total system cost variance. As mentioned in Chapter 1, determining the shape and measure of location of the total cost distribution are beyond the scope of this research. This paper does assume that all component cost estimates (including the low and high estimates, which will be discussed later) are available.

Professional journals were included in the literature search, but they are oriented toward risk assessment in commerce and personal investment. Their contribution to this specific risk assessment problem was not significant.

For this reason, concepts in this chapter are primarily documented in government studies, articles from symposium proceedings, and official literature from the cost analysis and program management communities of the three military services.

Organization

Following a brief background of risk analysis, this chapter will review the general risk assessment approach. It discusses the techniques used to determine distributional shape, measure of location, and variance for the components and how these are transformed into the equivalent information for the total system. It concludes with a portrayal of this total system information in a cost-probability relationship.

Background

The history of DoD risk assessment is quite recent. The post-Korean conflict era found the military services with ample funding for weapon system development and acquisition. Cost growth was generally tolerated and easily absorbed by the national budget. Events changed in the 1960's and 1970's as the Federal budget expanded in social entitlements. As competition for scarce Federal resources intensified, military cost growth quickly became more politically sensitive. This scrutiny of DoD management fathered the need to apply risk concepts in order to identify and control acquisition costs.

In the wake of this period of cost growth sensitivity, the 1981 Defense Acquisition Improvement Program highlighted DoD's cost-risk awareness. Mr Carlucci's Initiative #11 'recommended' an increased effort to quantify risk within the DoD, and directed the military services to adopt a method to budget funds for risk and uncertainty (10:55).

Early work with DoD risk assessment was done primarily by the RAND Corporation. Eventually, the problem received increased, cooperative attention from industry, government and academe. The first symposium to include the management of risk in the defense acquisition process was hosted by the University of Southern California (U.S.C.) in 1979. A second workshop, held at the Air Force Academy in 1981, was co-sponsored by U.S.C. and the Air Force Business Research Management Center. The most recent workshop met at the DSMC in 1983 (13:6). The workshop has now evolved into a biannual Defense activity.

Despite this increased emphasis on risk applications, most current DoD acquisition policies do not require formal, quantitative risk assessments. One exception is the Army's Total Risk Assessing Cost Estimate (TRACE) program which requires risk assessments for selected programs and incorporates the results into the budget process (10:61).

The Risk Assessment Process

Cost-risk assessment techniques follow the general approach illustrated in Fig. 2.1. This process has three

basic steps (21:3-4).

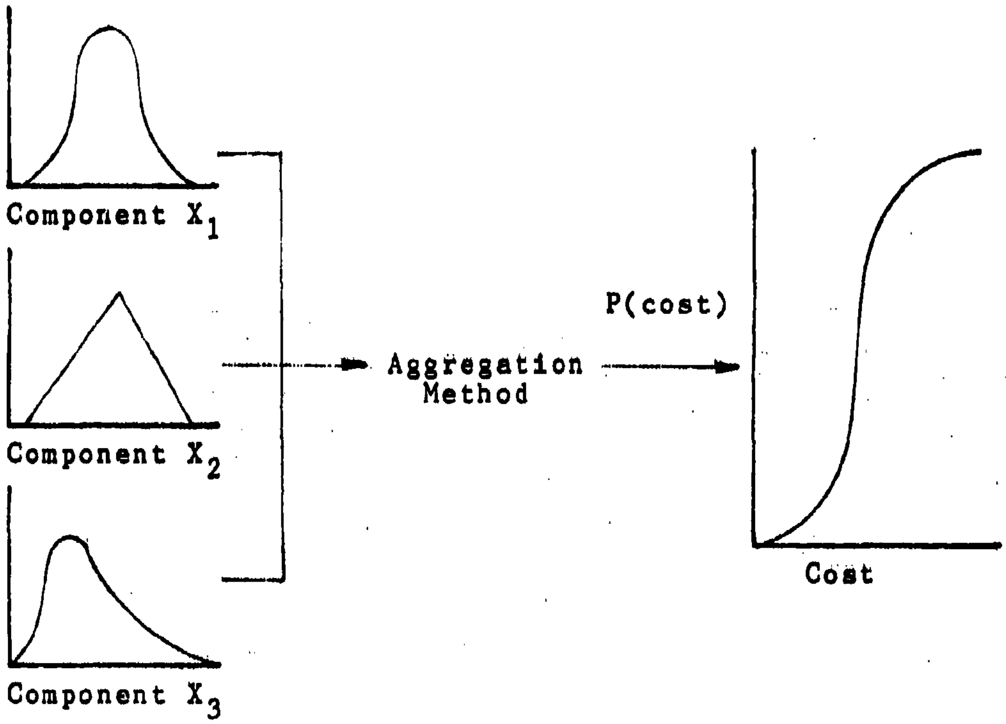

Fig. 2.1. Risk Assessment Process Adapted from (18:194)

First, the weapon system is broken into its components at some specified level of detail. The breakdown of each system should go as low as necessary to include those components which are considered to have particularly high risk (11:250). The cost uncertainty for each component is then represented by a distribution of the possible costs for the component. Second, the component distributions are transformed into a cost distribution for the total system using some aggregation method in order to reflect the amount of uncertainty in the total system cost. Third, this total

distribution is expressed in probabalistic terms to aid program management decisions. The following sections describe these steps in more detail.

Step One. Component costs are point estimates that are derived from cost estimating techniques such as: parametric (cost estimating relationships), detailed (bottoms-up), analogy, and constant multiplier (factor) (D:136). These techniques require information about component physical and performance characteristics, manhour and material requirements, or a subjective estimate about the similarities of the component to other components for which the costs are known.

The potential cost variability around these point estimates is often represented by a probability density function (p.d.f.). The shape of the p.d.f. often has the following characteristics:

1. fixed, positive upper and lower bounds
2. not necessarily symmetric
3. unimodal
4. computationally simple (18:195)

Flexibility is also desirable, such that changing the values of the distribution's parameters allows it to assume many variations of its general shape. This characteristic offers adaptability in representing a variety of cost patterns (21:5). Most analysts use the Beta distribution. Others prefer the Gamma, Normal or Weibul distributions because these are un-bounded in at least one direction, and there-

fore, leave open the possibility of unusually high and/or low cost outcomes (18:195). The unbound portion(s) of the curve run asymptotic to the x-axis; therefore, the probability of extremely high and/or low values approaches zero (21:5). The triangular distribution may also be appropriate (18:195). The selection of a distribution shape is largely a matter of analyst preference and insight into the possible cost outcomes. Two or more distribution shapes may be reasonable choices in many situations.

Once a distribution has been selected, the program management team often needs to estimate only three values to determine the distribution's variance: low cost, most-likely cost and high cost. The low estimate should be that cost which results from the most optimistic conditions. The probability of achieving a cost below this value is zero for a bounded distribution. The most-likely estimate is the most-probable cost, or the mode of the distribution. The high estimate should be that pessimistic cost which reflects the worst conditions. The probability of exceeding this high value is also zero for a bounded distribution (17:A-50).

Given these three values, a formula may then be used to calculate the variance. For example, the approximate variance of a Beta distribution is calculated by squaring one-sixth of the difference between the high and low estimates (9:138; 12:30).

Naturally, the low, most-likely, and high estimates are

subjective. Kazanowski feels that the most-likely value is generally the most difficult to estimate because of estimator indifference to a broad mid-range of values (9:138). For certain distributions this is true. Fig. 2.2(a) represents such a case where the estimator may be reasonably certain about the upper and lower bounds, but a large degree of indifference exists for the most-likely value.

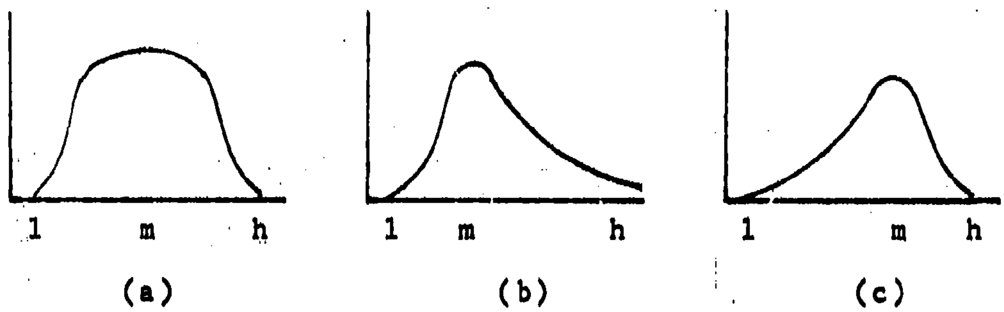

Fig. 2.2. Cost Distribution Examples

However, the distributional shapes shown in Fig.s 2.2(b) and 2.2(c) are so greatly skewed in one direction that the high or low cost may be the most difficult to estimate.

Analysts may feel uncomfortable in estimating absolute low or high costs, particularly if they perceive extreme skewness and have selected an unbounded distributional shape. In those cases, the low and high estimates need not be absolutes. Instead, the analyst may select a reasonably low cost and estimate the associated probability of underrunning it. He also selects a reasonably high cost and estimates the probability of overrunning it. For example,

McNichols provides a revised formula for calculating the approximate variance for a Beta distribution when the 5 and 95 percentile costs are given. The formula is the difference between the high ($x_{.95}$) and low ($x_{.05}$) estimates divided by 3.2, quantity squared (12:36). Similarly, with a triangular distribution, Wilder and Black provide a means of calculating the absolute high and low costs using any percentile (17:A-50). Once the absolute high and low costs have been calculated, they may be used in a formula to find the variance for the distribution.

Step Two. The next step in the process is to transform the cost estimate, distribution shape and the variance for each component into an overall cost distribution for the total weapon system (21:4). A common technique for determining the shape of the distribution is the method of moments, which was first applied by McNichols in 1976 (18:195A). The technique is generally used in conjunction with parametric cost estimating methods. As a result, it generally relies on a large historical database to determine the probability distributions for the components and the total system (12:20).

The method-of-moments characterizes each component cost distribution by four additive moments. The first additive moment is the mean of the distribution, that is, the first moment about the origin. The second and third additive moments are central moments (moments taken about the mean). The second moment is the variance, which measures squared

deviations about the mean, while the third moment is used to measure asymmetry. The fourth additive moment measures peakedness, and is formulated using the second and fourth central moments (16:130). The four additive moments are expressed analytically so that the formulas have additive properties. For example, the second moment (variance) for the total system is the summation of all the component second moments. Therefore, the shape of the total cost distribution for a system with independent components is found by summing the similar moments of every component. The analyst may then 'fit' a selected distribution to the four moments with the aid of computerized routines (16:130).

The measure of location, or the point estimate, for the total system cost has not been calculated in a wholly consistent manner. The method-of-moments uses the sum of the component first moments (means) as the total system cost estimate (4:F-25; 21:36). Kazanowski, who used a less sophisticated approach to risk assessment than the method-of-moments, also summed the component means. He calculated individual component means with a formula using low, most-likely, and high costs, similar to the method discussed earlier for calculating component variances (9:153). In contrast, the Army's TRACE model uses the sum of the point estimates (modes) as the total system cost (8:46). Another method is used by the Air Force's computerized RISK model, where the median value of the total system cost distribution was selected as the best measure of total cost (7:7). The

median is that value whose cumulative probability of occurrence is 50%.

The literature is significantly more consistent on calculating the total system cost variance than it is on the measure of location. With the few exceptions that will be discussed shortly, analysts assume independence between components and sum their variances for the total system cost variance (16:130; 21:39; 12:20). The method-of-moments typifies this approach, where the variance of the total system is the sum of each component second moment (16:130). The literature clearly documents the need to include covariance terms in order to compute total system cost variance when components are dependent (21:39; 9:153).

<u>Step Three</u>. The final step translates the total system cost distribution into a cost-probability relationship. While the probability density function provides the decision maker with a graphic picture of the cost variability, probability assessments are difficult in this format because probabilities are represented by the area under the curve (4:II-8). A cumulative distribution function (c.d.f.) translates the area under the curve for each cost value into a cumulative probability. The c.d.f.'s in Fig. 2.3 allow the program manager, or other decision maker, to assess the probability of over or underrunning a given program cost. For example, according to Fig. 2.3(a), there is an 80% chance that a hypothetical program will cost less than $200.

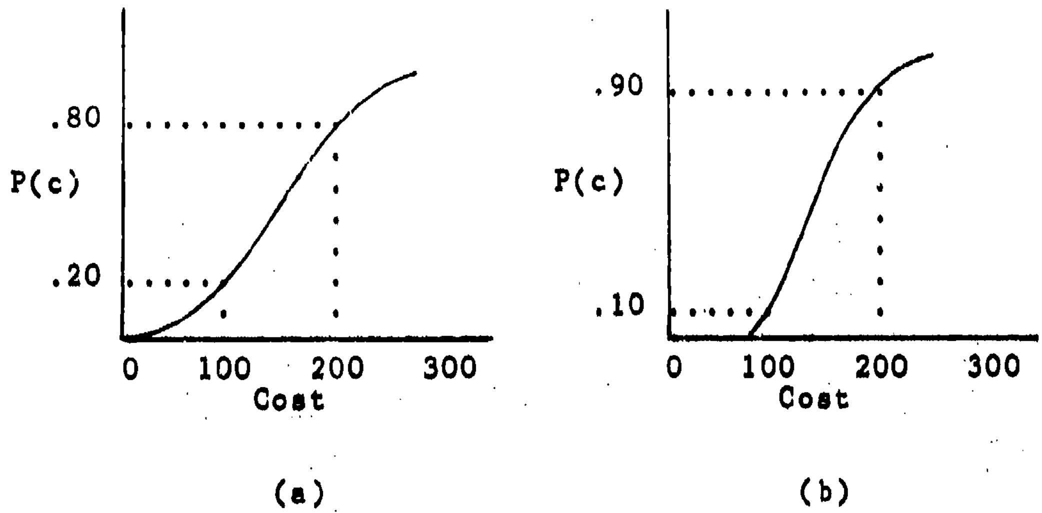

Fig. 2.3 Cumulative Cost Distributions

Stated another way, the probability of overrunning $200 is 20%. Cumulative distribution functions also reveal the probability of a program outcome between any two costs. Figure 2.3(b), for example, shows the probability of achieving a cost between $100 and $200 is 80% (90%-10%). The probability of a similar cost outcome on Figure 2.3(a) is only 60%. A steeper c.d.f., therefore, indicates a smaller cost variance and less program cost-risk.

Current Perspectives on Component Dependency

Most current risk assessment techniques, such as the method-of-moments, rely on the erroneous assumption of independent system components. The problem with this assumption is that, in most circumstances, it understates true program cost-risk (9:150, 16:130).

The literature explains why analysts continue to rely

on this assumption in spite of its weakness. Black calls the independence assumption "troublesome" (16:130), but cites computational ease as one reason for its use. Analysts have not been able to apply the method-of-moments, for example, to situations with realistic component dependency. Because the method-of-moments technique is mathematically rigorous, derivation of moment functions with additive properties is not possible unless component dependencies are perfectly predictible (16:133). The technique becomes unwieldy if it incorporates any deviations from a strict linear relationship between components.

Worm feels that the continued reliance on the independence assumption rests in the difficulty in expressing dependency between components in a meaningful way. Quantifying covariance terms has been elusive because of the lack of historical data or of a method to estimate covariance from subjective information (21:39).

Only limited efforts have been taken to resolve the dependency problem. Wilder and Black's approach was to place an upward bound on the cost-risk of component dependency rather than estimate its true affect. Two situations were assessed - independence and complete linear dependence.

> If we make the opposite assumption, i.e., that there is complete [positive] linear dependence among the project elements, in effect we say that any problem with any element will be reflected in all elements, and conversely any 'good luck' will be similarly reflected. This assumption may not be valid in many situations, but we feel that it is closer to reality than the independency assumption, and the region between the two

assumptions may be considered to bound the set of intermediate outcomes [16:130].

The method-of-moments was used to develop a cumulative cost distribution for both assumptions. The two curves, as shown in Fig. 2.4, bracket the actual, unknown curve. To apply this concept, Wilder and Black derived a series of dependent moments. The first dependent moment is the mean of the distribution, while the remaining k^{th} dependent moments are the k^{th} root of the k^{th} central moment. The relationship between the dependent and the independent moments is shown below:

$$A_1 = O_1 = D_1 = \mu \qquad (2.1)$$

$$A_2 = C_2 = D_2^{\,2} \qquad (2.2)$$

$$A_3 = C_3 = D_3^{\,3} \qquad (2.3)$$

$$A_4 = C_4 - 3C_2^{\,2} \qquad (2.4)$$

$$C_4 = D_4^{\,4} \qquad (2.5)$$

where

D_k = k_{th} dependent additive moment
A_k = k_{th} independent additive moment
C_k = k_{th} central moment
O_1 = first origin moment

The dependent moments have the same additive properties as the independent moments. Therefore, the dependent moments of the total program are the sums of the dependent moments of each component (16:130-131). Referencing Fig. 2.4, the independent curve underestimates the program risk for sys-

tems with predominantly positive dependence, while the dependent curve overestimates it. "It is a matter of judgement to determine where in this area the 'truth' lies" (16:131).

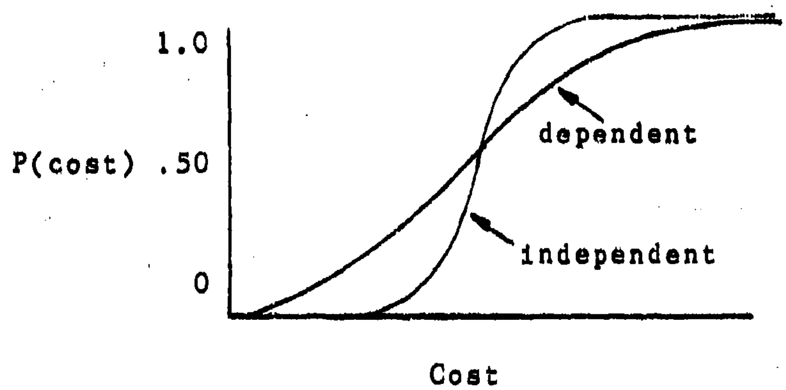

Fig. 2.4. Cumulative Distribution Functions
Adapted from (16:132)

Worm offers a second approach. Rather than bound the problem, he attempts to structure the dependency between components . Using contract pricing items for system components, Worm breaks each component into independent and dependent portions. The dependent variation in each component is thought to stem from a common set of exogenous factors which affect all system components. To illustrate this concept, two components, such as labor and material costs, may both be excessive because of design immaturity. The dependency between these components is reflected by the influence of the common factor, design maturity, on both components. When more than one of the exogenous factors are present, their effect on each component is estimated cumula-

tively. The contribution of all exogenous factors is summed for each component and the aggregated value collectively becomes a single, separate and independent element. Each component is then viewed as the sum of two independent random variables and the traditional additive properties of the method-of-moments apply (21:39-43).

The Authors' Viewpoint

The successful inclusion of component dependence in cost-risk assessment has been elusive. Two approaches to dependency were observed. The authors' believe that neither approach satisfactorily resolves this problem.

Wilder and Black bounded the problem by taking a totally dependent and independent perspective. Neither assumption is valid. They both intentionally mis-state true program risk. Quantification of covariance terms was unnecessary because the components had either no influence on each other or were maximum linearly dependent. Components with negative dependence were not considered. While some insight was gained, its information value is limited by the broad range of subjectivity left to the decision maker.

Worm's approach toward dependency is also inadequate. Even if all the exogenous factors are correctly identified, a significant weakness remains. By structuring dependency around a set of external influences, the interrelationship of the components themselves are ignored. As shown in Fig. 2.5(a), Worm's cost estimating relationships do not account

for the direct association between system components. The true cost dependence relationships which need to be modeled are shown in Fig. 2.5(b).

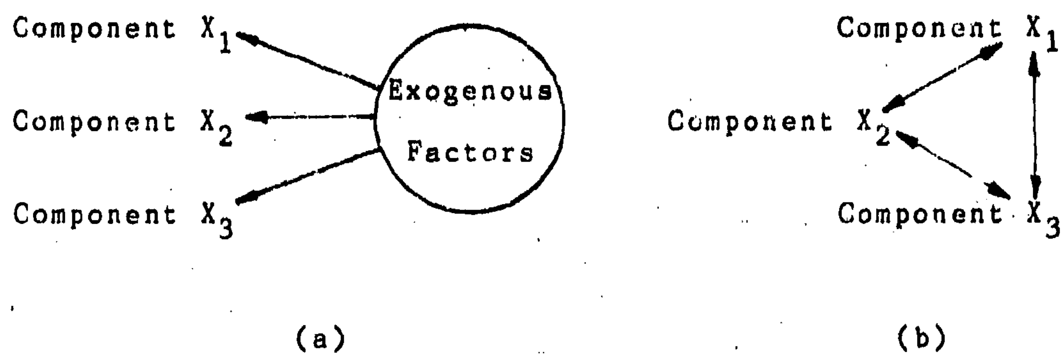

Fig. 2.5 Component Cost Dependence Relationships

Conclusion

This chapter reviewed the general risk-assessment process. Techniques were briefly described for estimating a component's cost, variance, and distributional shape. Methods were described to transform this component information into the equivalent information for the total system. The difficulties in incorporating component dependence into a total system cost variance were discussed. Two approaches to this problem were reviewed, along with their limitations.

III. Methodology

The literature review on cost-risk assessment, summarized in Chapter 2, revealed that cost dependent relationships are not used in current cost-risk assessment methods. This research attempts to overcome that limitation. The chapter is divided into two sections. The first section develops a cost-risk assessment method that incorporates component cost dependence. The second section explains the approach used to demonstrate the significance of component dependence in cost-risk assessment, and describes the procedure used to verify the internal validity of the proposed method. Fig. 3.1 shows a general scheme for the research.

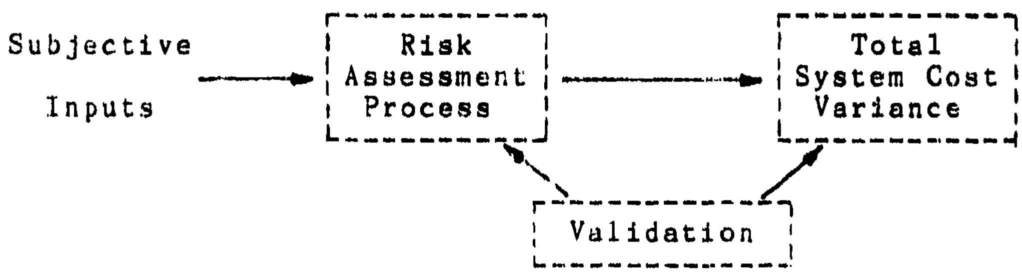

Figure 3.1 Generalized Cost-risk Assessment Method

Cost-risk Assessment Methodology

Total System Cost Variance. In the generalized form, total system cost variance can be expressed as the sum of component variances and the covariances between components. This generalized expression is shown in the following equation:

$$\text{TOT SYS COST VAR} = \sum_{i=1}^{n} \sum_{j=1}^{n} \text{Cov}(X_i, X_j) \tag{3.1}$$

where

n = number of system components
X_i = ith component of the system
X_i, X_j = component pair within the system

and

$$\text{Cov}(X_i, X_j) = \text{Var}(X_i) \quad \text{when } i=j \tag{3.2}$$

Winkler and Hayes (19:186) define covariance in terms of expected values as

$$\text{Cov}(X_i, X_j) = E\,[\,(X_i - E(X_i))\,(X_j - E(X_j))\,] \tag{3.3}$$

When dealing with population samples, the expression is modified to

$$\text{Cov}(X_i, X_j) = E\,[\,(X_i - \bar{X}_i)\,(X_j - \bar{X}_j)\,] \tag{3.4}$$

The associative property, when applied to expected values, states that $E(ab) = E(ba)$. The order in which the terms are multiplied has no effect on the expected value. Therefore, Eq (3.4) can be written as:

$$E[(X_i - \overline{X}_i)(X_j - \overline{X}_j)]$$
$$= E[(X_j - \overline{X}_j)(X_i - \overline{X}_i)] \quad (3.5)$$

Therefore,

$$Cov(X_i, X_j) = Cov(X_j, X_i) \quad (3.6)$$

The covariance between any two pair of components appears twice in Eq (3.1), once as $Cov(X_i,X_j)$ and once as $Cov(X_j,X_i)$. By substituting $Cov(X_i,X_j)$ for $Cov(X_j,X_i)$ whenever j is greater than i, the total number of covariance terms in Eq (3.1) is reduced by half. Only the covariance terms $Cov(X_i,X_j)$ for i less than j remain in the equation. Furthermore, each term is multiplied by two to account for the substitution.

In the cost-risk assessment process, for a given system having two components, X_1 and X_2, the determination of total system cost variance requires three steps.

Step One. Determine the variance for the cost distribution of Component X_1 and Component X_2. This is usually accomplished by determining the low, most-likely, and high cost values and applying a variance assessment technique as described in Chapter 2.

Step Two. Determine the covariance between components X_1 and X_2. Currently, this is a major problem in acquisition program cost estimation. A latter part of this chapter will offer a subjectively-based means of measuring

the strength of a dependency relationship.

<u>Step Three</u>. The cost variances and covariances of each component and its pairwise influence are summed. For the two component system, the following terms are generated: $Var(X_1)$, $Var(X_2)$, $Cov(X_1,X_2)$, $Cov(X_2,X_1)$. From Eq (3.6), the third and fourth terms are equal, so

$$Cov(X_1,X_2) + Cov(X_2,X_1) = 2Cov(X_1,X_2) \tag{3.7}$$

The total system cost variance can then be expanded in equation form from Eq (3.1) to

$$\text{TOT SYS COST VAR} = Var(X_1) + Var(X_2) + 2Cov(X_1,X_2) \tag{3.8}$$

<u>Limiting Combinations and Covariance Terms</u>. In a system with more than two components, more than two covariance terms must be expressed, one for each pairwise combination. The number of covariance terms required is the combination expression:

$$\binom{n}{2} = n! \,/\, 2!(n-2)! \tag{3.9}$$

where

n = number of components in the system

The number of pairwise combinations rises quickly as the

number of components in the system rises. For example, in a system with three components, the number of covariance terms required is:

$$\binom{3}{2} = 3! \;/\; 2!(3-2)! = 3 \qquad (3.10)$$

However, the required combinations for a system with ten components is:

$$\binom{10}{2} = 10! \;/\; 2!(10-2)! = 45 \qquad (3.11)$$

Since much larger systems are not uncommon, the authors will simplify the research by defining a system as a linear series of components. Components will have, at most, only one preceding and one subsequent task. A major assumption with this approach is that all component dependence is captured in a sequential manner. For example, dependence between components X_1 and X_3 is assumed to be accounted for by the intervening component, X_2. Component X_1 has no cost relation to Component X_3, except as indirectly transferred through Component X_2. The system, therefore, is greatly simplified because it has only 'n-1' covariance terms rather than the theoretical maximum in Eq (3.9).

<u>Covariance Interpretation</u>. The preceding paragraphs have discussed the definition of covariance, its properties, and how it affects the total system cost variance. While a covariance term can assess the association between two com-

ponents, it is not without its flaws. There are three problems with covariance - all caused by its units of measurement.

First, the magnitude of the covariance term is extremely sensitive to the components' units of measurement. If the units of Component X_1 and Component X_2 are expressed in dollars, the covariance term is expressed with these units: $\mathrm{Cov}(X_1, X_2)$ (dollars) (dollars). If, however, the units are expressed in other terms, such as cents, the magnitude of the covariance will change even though the relationship between the components remains the same. Essentially, the magnitude of the covariance term can be manipulated by changing the units of the dependent components.

The second issue concerning units in the covariance term is that the units do not make sense. If Component X_1 and Component X_2 have units of pounds and miles respectively, the resulting covariance term will be expressed in pound-miles. This expression is confusing and serves no useful purpose in the determination of dependence between the two components.

The third problem with units deals with the comparability of different covariance terms. The different units that are used with the covariance term prohibit the comparison of the dependence between different pairs of components. The following example illustrates this problem. $\mathrm{Cov}(X_1, X_2)$ is expressed in the same units used to measure Component X_1 and Component X_2. If Component X_1 is measured

in pounds and Component X_2 is measured in miles, the covariance between the components is measured in pounds times miles. Likewise, if Component X_3 and Component X_4 are measured in volts and square feet, respectively, the covariance between them is measured in volts times square feet. Obviously, this difference in units of measure makes it impossible to compare $Cov(X_1,X_2)$ with $Cov(X_3,X_4)$. It is a comparison of apples and oranges.

Correlation Coefficient and Variance-Covariance Relationships. In order to compare covariances, the variances of the components (component costs in this case) are used to scale the covariance terms. The outcome is the correlation coefficient, Rho (R).

$$R_{X_i X_j} = Cov(X_i,X_j) \ / \ [\ Var(X_i)\ Var(X_j)\ ]^{\frac{1}{2}} \qquad (3.12)$$

The correlation coefficient ranges from -1 to +1. A value of -1 corresponds to maximum negative linear dependence; a value of +1 corresponds to maximum positive linear dependence; and a value of 0 corresponds to independence between the components' costs. These terms were defined in Chapter 1.

Eq (3.12) makes it possible to solve the problems of units of measure that were discussed earlier. For Component X_1 and Component X_2 in pounds and miles, Eq (3.12) scales the covariance term by eliminating the units of measurement. In order to avoid confusion and to illustrate this point, Eq

(3.12) is modified to show only the units in the equation.

$$R_{X_1X_2} = (\text{pound-miles}) \;/\; [\;(\text{pounds})^2(\text{miles})^2\;]^{\frac{1}{2}} \quad (3.13)$$

The units in the equation cancel. $Rho_{X_1X_2}$ is now a unitless value whose magnitude has been scaled. The relationship between Rho, component variances and component covariances is a critical relationship for this research. The popular assumptions of component independence and maximum positive linear dependence are based on this relationship. Later, this relationship will be used as a major part of the cost-risk assessment method that this research proposes.

The Independence Assumption. In Chapter 2 it was mentioned that since the quantification of dependency between the cost of system components is difficult to assess, many cost-risk assessment methodologies assume component independence. This assumption allows for the exclusion of the covariance terms from the total system cost variance equation. The independence assumption means that there is no association between the cost of one component and the cost of any other system component. The independence assumption also implies a Rho value of zero (19:187). Therefore,

$$R_{X_1X_2} = Cov(X_i,X_j)/[\;Var(X_i)\;Var(X_j)\;]^{\frac{1}{2}} = 0 \quad (3.14)$$

If Rho is zero, the numerator of the ratio must be zero.

Therefore, the independence assumption implies

$$Cov(X_i, X_j) = 0 \tag{3.15}$$

The equation for total system cost variance, then, can be expressed as

$$\text{TOT SYS COST VAR} = \sum_{i=1}^{n} Var(X_i) \tag{3.16}$$

The effect of this deletion is obvious. Assessment of covariance terms is unnecessary under the independence assumption.

<u>The Maximum Positive Linear Dependence Assumption</u>. Since the assumption of total independence seems to violate our intuitive understanding of how systems are developed, some cost-risk assessment methodologies assume total positive linear dependence between component costs. Total positive linear dependence means that if the cost of one component is higher than expected, not only will the the cost of all subsequent components be higher than expected, but the magnitude of the overrun can be predicted with absolute certainty. In essence, the total system cost is entirely determined by the cost of the first component in the system.

This assumption also enables us to compute the total system cost variance without estimating covariance terms. Again, the expression for Rho is used to demonstrate this phenomenon. Total positive linear dependence between two

components' costs is represented by a correlation coefficient equal to +1. When Rho is one, Eq (3.12) gives the following solution for the covariance:

$$R_{X_1X_2} = Cov(X_1,X_2)/[\ Var(X_1)\ Var(X_2)\ ]^{\frac{1}{2}} = 1 \quad (3.17)$$

and

$$Cov(X_1,X_2) = [\ Var(X_1)\ Var(X_2)\ ]^{\frac{1}{2}} \quad (3.18)$$

In general,

$$Cov(X_i,X_j) = R_{X_iX_j}\ [\ Var(X_i)\ Var(X_j)\ ]^{\frac{1}{2}} \quad (3.19)$$

The fact that Rho falls between -1 and +1 means that the $Cov(X_1,X_2)$ is at its maximum value when Rho is one. Therefore, Eq (3.1) for the total system cost variance will also be maximized when total positive linear dependence is assumed.

For the two component example, making the substitution shown in Eq (3.18) in the equation for total system cost variance gives the following expression:

$$\text{TOT SYS COST VAR} = Var(X_1) + Var(X_2) + 2\ [\ Var(X_1)\ Var(X_2)\ ]^{\frac{1}{2}} \quad (3.20)$$

Under the assumption of total positive linear dependence,

total system cost variance can be expressed without the use of covariance terms. As mentioned in previous chapters, this approach is not intuitively appealing because it assumes that extreme cost outcomes will ripple through the entire system. Using this assumption, therefore, inflates the total system cost variance.

<u>The Maximum Negative Linear Dependence Assumption</u>. Component cost dependencies are not always positive - a low cost in one component does not always mean that other components' costs will be low; a high cost in one component does not always mean that other components' costs will be high. When a low cost in one component is associated with a high cost in another component, the dependency relationship is negative. The assumption of maximum negative linear dependency sets the value of Rho for all pairwise combinations of components equal to -1. Eq (3.19) indicates that if Rho is -1, the covariance term takes on its smallest possible value, which also happens to be negative.

$$Cov(X_i,X_j) = -1\ [\ Var(X_i)\ Var(X_j)\ ]^{\frac{1}{2}} \qquad (3.21)$$

Therefore, Eq (3.1) will be minimized when total negative linear dependence is assumed.

<u>Conclusions About Total Linear Dependence</u>. These two assumptions, total positive linear dependence and total negative linear dependence, generate the maximum and minimum bounds for the true value of the total system cost variance.

Normally, it is expected that some covariance terms would be positive and some would be negative. The sum of the covariances may be negative or positive, depending on the sign and magnitude of the individual terms. To the extent that this sum differs from zero, the total system cost variance obtained under the assumption of total independence will either over- or underestimate the true system cost variance.

Estimating the Covariance. As Chapter 1 mentioned, the database does not exist to calculate covariance terms. This necessitates the use of subjective information to determine the degree of cost dependence between components. This information, solicited in terms that are understandable to program personnel, must be converted into a quantitative covariance value for risk assessment.

Direction of the Dependence. One piece of information that the analyst needs in order to estimate the covariance is the direction of the component dependencies. The direction can be implied simply by asking the program specialist how the extreme cost outcomes for one component (high or low) relate to the extreme cost outcomes for the other component. The high and low costs have the same meaning here as they did in the variance estimating techniques in Chapter 2. If, in the specialist's judgement, component cost outcomes tend to be complimentary (high-high or low-low), then the implied sign of the relationship is positive. If, on the other hand, the cost outcomes are

perceived to be generally opposite (high-low or low-high), then the relationship is assumed to be negative. The most-likely cost outcome could also be used, but the extreme values give the analyst the best insight into the direction of the component dependencies.

Strength of the Dependence. Program personnel will not be able to directly estimate the magnitude of the covariance because the covariance lacks any intuitive meaning. As mentioned earlier in this chapter, covariance may be expressed in units which are nonsensical and the magnitude of the covariance will fluctuate with the scale of the units of measurement. Conceivably, these problems could be overcome if subjective inputs were solicited in terms of the scaled covariance, Rho. Rho is unitless and is standardized on the interval (-1,1). A more appropriate technique, however, would be to solicit subjective inputs in terms of the coefficient of determination, Rho squared.

Winkler and Hays describe the coefficient of determination as the proportion of total variation in a variable that is accounted for by a linear relationship with another variable (19:633). For example, a Rho squared value of .49 (Rho=.7) indicates that the relationship between the two variables accounts for 49% of the total variation which would occur if the variables were independent. Essentially, Rho squared and Rho are the same measure of association because the magnitude of one can be determined from the magnitude of the other. Rho lies on the interval (-1,1).

Rho squared is always positive and is bound by (0,1).

The advantage of using Rho squared to assess the strength of dependency is that it measures variation in terms of proportions. Therefore, identical increments anywhere along its interval have the same 'explanatory power' because each fixed increment represents a constant proportion of total explained variation. For example, changes in Rho squared from .1 to .2 and from .8 to .9 both increase explained variation by 10%. Rho, however, is not as 'well-behaved' as Rho squared. Increases in Rho that are near the endpoints of its interval have greater 'explanatory power' than the same increment near the center of the interval. For example, a similar change in Rho from 1. to .2 and from .8 to .9 would explain 3% and 17% more variation, respectively. Program personnel are more likely to give more representative assessments of the magnitude of component dependence if the analyst uses Rho squared.

To apply the coefficient of determination, the program specialist is asked to rate the likelihood of the cost relationship that he identified earlier for the direction of the dependence. Any program personnel should be able to interpret a question such as, "On the scale shown in Fig. 3.2, what is the predictability of a component's cost outcome (high or low), given that the cost of the other component was high, or low"?

totally uncertain	moderately certain	completely certain

0 --.1 --.2 --.3 --.4 --.5 --.6 --.7 --.8 --.9 --1.0

Fig. 3.2 R^2 Measurement Scale

The values on the interval in Fig. 3.2 measure the cost association in a manner that is analogous to Rho squared. Each value on the interval represents the proportion of certainty in the cost dependence between components. This is similar to Rho squared, which measures the proportion of total variation that is explained by the relationship with another variable. Values near 0 imply component independence and values near 1 imply total linear dependence. Once the amount of dependence is assessed, the magnitude of Rho is calculated by taking the square root of the number that was selected on Fig. 3.2. Rho will be used later to calculate an estimate for the covariance.

An alternate method estimates the strength of the dependency without relying on any numerical input from the program specialist. Using descriptive categories, for example, the program specialist should be able to categorize the cost association between components as either weak, moderate, strong, or none. The number of categories could be expanded, but for simplicity, only these four will be considered here. An assignment for the magnitude of Rho can be made to each descriptive category. Devore lends credibility

to such an approach by giving general descriptive qualities to various Rho values (5:184). An example of these assignments are shown below in Table 3.1.

Table 3.1

Rho Value Assignments

Component Relationship	Rho Value
None	0
Weak	.1 to .3
Moderate	.3 to .7
Strong	.7 to .9

The actual magnitude used for Rho could be the midpoint of the appropriate interval. The width of each interval will narrow as the number of descriptive categories is increased.

The magnitude of Rho, based on either technique, is merged with the assessment of the dependency direction. Combined, the two result in a positive or negative Rho value. An estimate of the covariance can now be made from the Rho value and the statistical relationships which were previously discussed with Eq (3.19).

$$Cov(X_i, X_j) = R_{X_i X_j} \left[Var(X_i)\ Var(X_j) \right]^{\frac{1}{2}} \tag{3.19}$$

The covariance is calculated from the component variances and the Rho estimate that was determined above.

Validation Methodology

The application of this cost-risk assessment technique to a real system would not provide an adequate basis for validating the methodology because each program represents only a single event from a unique distribution. The final cost outcome for any single program provides insufficient information to test the accuracy, or lack thereof, of the variance produced by risk assessment techniques. For example, a cost outcome that deviates substantially from the initial estimate could imply that the true system cost variance was underestimated. This is illustrated in Fig. 3.3(a). However, it could also be true that the total system variance is accurately estimated, as in Fig. 3.3(b), but the 'most-likely' cost estimate is in error. Finally, both the point estimate and the variance may be accurately estimated, but the outcome is a 'rare event', as in Fig. 3.3(c). The problem with only one data point is that the analyst will never know the true state of affairs.

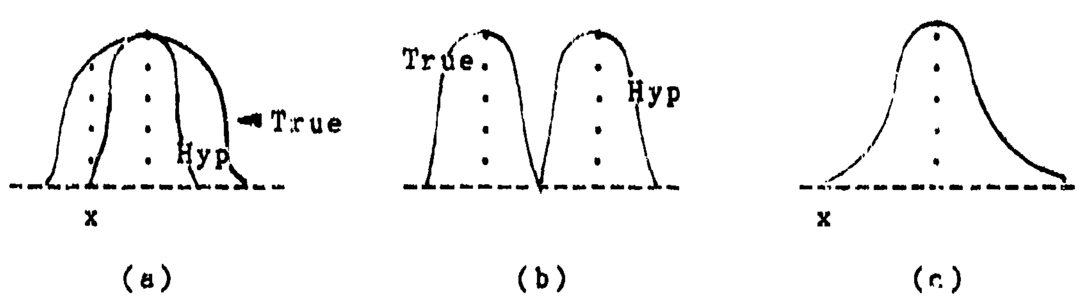

Fig. 3.3 a/b/c True vs Hypothesized Cost Distributions

Likewise, a cost outcome near the mode of the hypothesized distribution may give the analyst a 'warm feeling' which is entirely unwarranted. The fact that the outcome occurred near the mode of the hypothesized distribution says very little about the accuracy of the estimated total system variance. Furthermore, the outcome could be an outlying observation from a true distribution that differs significantly from the hypothesized distribution. Again, the evidence is inadequate to draw any reasonable conclusions.

Because the cost-risk methodology can never be validated, in the true sense, by real-world application, the authors propose a simulation technique as a quasi-validation tool. If the subjective inputs used in the method are assumed to be correct, the effect of component dependence on the total system cost variance is indicated by comparing the results of the simulation with the case where no dependencies exist. When errors in the subjective inputs are considered, simulation will lend insights on the sensitivity of the total system cost variance to those errors.

<u>What is Simulation</u>? Banks and Carson (1:2) describe simulation as the imitation of a real-world system. The behavior of the real system is studied by developing a model which describes the salient characteristics of the real system through mathematical and logical relationships. Models that do not use random variables as inputs are deterministic. These models have a known set of inputs which result in a unique output. A stochastic simulation has one

or more random inputs and leads to random model outputs (1:10). The simulation model proposed in this thesis will generate repeated estimates of the total system variance from stochastic inputs which measure component dependency. Multiple iterations of the simulation generates an estimate of the true distribution of total system variance for the system described by the model.

<u>Description of the Simulation Model</u>. The model used in this thesis simulates a generic system as illustrated in Fig 3.4, where 'n' is the number of system components. The components are completed in sequence such that each component has only one precedent task.

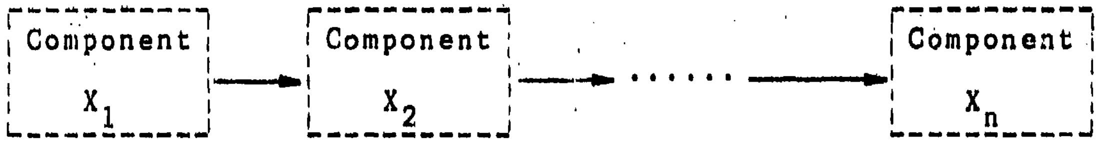

Fig. 3.4 Generic Sequential System

This simplification restricts the number of possible systems to consider when compared to a WBS configuration. Given 'n' system components, a WBS hierarchy has the flexibility of describing the component relationships in a variety of ways, while the sequential system has only one. Such a restriction is desireable because it allows us to examine dependency relationships in their simplest form. This simplicity also makes the system easier to model because the system definition can be changed by varying system size without

having to redefine its 'shape'. Note, however, that this simplification is made for research purposes only. In no way does it restrict the cost-risk assessment method from application to a WBS hierarchy. As mentioned earlier, the simplification reduces the number of component pairs for the system to 'n-1'. This methodology can easily be extended to any WBS framework with potentially as many component cost relationships as described by Eq (3.9).

The simulation model stochastically generates Rho values for the 'n-1' component pairings based on a triangular distribution with (0,1) bounds. The triangular distribution was chosen because it is unimodal and easy to manipulate. With the fixed endpoints, the researchers have complete control over the distribution by changing only one value, the mode. The mode of the distribution represents a Rho value that could likely result from a program specialist's assessment of component dependence. Manipulating the mode allows the researchers to vary the program specialist's estimates of the component relationships. The mode applies for all 'n-1' component pairs, but the exact Rho value generated for each pair will randomly deviate from the mode according to the distribution. The mode is specified in the simulation as either .50, .707, or .866.

A uniform distribution is then used to randomly select Rho values which are subsequently given a negative sign to indicate a negative dependency. The approximate proportion of the Rho values identified as negative dependencies is

controlled by the modeler's selection. The proportion is set to either 1.0, .75, or .50.

The model then uses component variances, which are held constant throughout the simulation, and the 'n-1' Rho values to calculate the covariance terms for each sequential pair of components. Total system variance is then calculated by summing the variance and covariance terms. Each observation from the simulation represents one total system variance estimate using randomly generated Rho values.

The model is then re-executed so that it generates a new series of Rho values using the same triangular distribution and proportion of negative Rhos. Covariance terms and total system variance are recalculated as before. The output of this simulation is another estimate of total system variance. Multiple iterations are performed to provide a distribution of probable total system variances under the stated characteristics of the system.

Sensitivity Analysis. As mentioned at the beginning of this chapter, the objectives of the validation effort are 1) to demonstrate the significance of component dependence in cost-risk assessment, and 2) to verify the internal validity of the proposed method. The researchers do not believe that the answers from these two objectives will be similar for all systems. Instead, modeling component dependence may be more critical for certain systems. Similarly, there may be some system 'limits' beyond which the proposed method is not a desireable technique. For this reason, the simulation

model tests a variety of system configurations. Table 3.2 summarizes those model inputs which characterize each system and the values they will assume. These values were chosen in order to investigate the broad spectrum of dependence scenarios that could occur in a system acquisition program.

Table 3.2

System Configurations

Model Parameter	Symbol	Values Assumed		
Mode of triangular distribution for rho	m	.5	.707	.866 *
Proportion of positive rhos	p	1.0	.75	.50
Number of components	n	5	50	100
Error in rho squared **	e	.10	.20	

* Values represent rhos which explain 25%, 50%, and 75% of total variation.
** To be discussed later in this chapter.

Simulations will be performed for all 54 combinations of input parameters. The number of iterations required to provide an appropriate estimate of total system variance for each system configuration is documented in Appendix A. The computer algorithm and associated documentation to perform these simulations is found in Appendix B.

Is Dependence Important? One objective of the validation effort is to determine if component dependence should be an important consideration in cost-risk assessment. Spe-

cifically, what impact does component dependency have on the total system cost variance? The simulation model was designed to answer this question. Recall that under the independence assumption, the total system cost variance is merely the sum of all of the component variances. The simulation model sums the component variances to attain the total system variance for the independent system. The model also simulates 54 different system configurations with various levels of component dependency. A distribution of the total system cost variance will be output for each of these systems. By comparing the total system cost variance under the independence assumption with total system variance distribution under the different system configurations, the impact of component dependence can be assessed.

A measure of significance is needed to compare independence with dependence. The ideal measure would be to compare the affect of both variances on the confidence intervals for a system's cost estimate using Eq (3.22).

$$\text{Interval Estimate} = \text{Point Estimate} \pm [(k)\ (s)] \quad (3.22)$$

In Eq (3.22), k represents the number of standard errors that must be added and subtracted from the point estimate to arrive at the interval estimate. It is a function of the probability distribution of cost outcomes and the desired level of confidence that the actual cost will fall within the interval. The standard error is represented by s. The

collective term, [(k) (s)], is the precision of the interval.

The above confidence interval in Eq (3.22) would be incorrect if it used the independent system standard error (s_I) when, indeed, the system has component dependence. The dependent standard error (s_D) would have to be used to provide the true confidence interval. Comparing the two confidence intervals would demonstrate the ultimate impact of component dependence on system cost uncertainty. This measure, however, is not available here because no system cost estimate was used, or assumed. This risk assessment method simply assumed that a cost estimate is available from current estimating techniques. Furthermore, k requires an assumption about the cost distribution's shape, which is beyond the scope of this research.

Although this research cannot directly compare the two cost intervals, it can make a direct comparison of the interval precision, as shown in Eq (3.23).

$$[\ (k)\ (s_D)\ ]\ /\ [\ (k)\ (s_I)\ ] \qquad (3.23)$$

Because k has a constant value, Eq (3.23) simplifies to $[(s_D)\ /\ (s_I)]$. The magnitude of this ratio indicates the relative impact of dependence relationships on the system's confidence interval. The ratio indicates to what extent the precision of the interval is over or understated. If the ratio is close to one, component dependency is not signifi-

cant and the difference between the cost interval using s_D and s_I is small. As the ratio moves away from one, in either direction, the component dependency relationships are more significant. Under these conditions, confidence intervals for weapon system cost estimates become increasingly unreliable using the independent standard error.

Because this research focuses on variances rather than standard errors, the authors will use the ratio of the two total system cost variances as the measure of significance. The relationship between the ratio of the variances and the ratio of the standard errors is shown in Eq (3.24).

$$\text{RATIO of VARIANCES} = (s^2_D \,/\, s^2_I) = (\, s_D \,/\, s_I \,)^2 \qquad (3.24)$$

The mean of the total system cost variance distribution will be used as the s^2_D for each system. The accuracy of this value in estimating the true mean of the distribution is discussed in Appendix A. The authors consider 1.2 an overestimate and .80 an underestimate of the precision [(k) (s)] in Eq (3.23) to be acceptable. Therefore, any ratio of total system cost variance that is between .64 and 1.44 meets the acceptance criteria. For those systems, the affects of component dependence is not considered to be significant.

Is the Methodology Internally Valid? A second ob-

jective of the validation effort is to determine the internal validity of the cost-risk assessment method. The internal validity indicates the ability of the analyst to predict the total system cost variance for a system with component dependence when the program specialist's subjective assessments are erroneous. Realistically, the specialist will not be able to estimate the strength of dependencies accurately. Additional error will be induced by the method which converts the specialist's inputs into a Rho value. This is especially true with the flexibility of Rho assignments to descriptive categories. As a result, errors in the Rho estimate will affect the calculation of total system cost variance. The simulations described so far have assumed that the analyst has an accurate Rho estimate. We assumed that the mode of the triangular distribution and the proportion of negative dependencies were correctly identified. The simulation will output a distribution of the total system variance under this assumptiong; we refer to it as the 'normal' case. However, this distribution would be affected by errors in estimating Rho, as demonstrated in Fig. 3.5.

```
                          ┌─────────────┐       R- ──→ Total Sys Var (low)
Subjective                │     Rho     │       |
            ────────────→ │ Estimation  │ ───→  R  ──→ Total Sys Var (norm)
  Inputs                  │  Technique  │       |
                          └─────────────┘       R+ ──→ Total Sys Var (high)
```

Fig. 3.5 Cost-risk Assessment with Rho Error

The simulation model evaluates the impact of the error in

subjective inputs by placing upper and lower bounds on the Rhos that are randomly generated. These bounds represent the analysts confidence in the Rho estimate. If an analyst feels uncertain about his estimate of Rho, he could place bounds around his estimate and also calculate the total system variance using these bounds as a way of evaluating the potential effect of his estimating error.

A method to bound Rho would be to bound the percent of total variation represented by Rho squared. For example, suppose the analyst feels that Rho is approximately .7, which equates to a Rho squared of .49. This figure indicates that the relationship between the two variables accounts for 49% of the total variation which would occur if the variables were completely independent. If the analyst felt that the correct total variation should not vary by more than plus or minus five percent, the upper and lower bounds on Rho squared would correspond to 54% and 45%, respectively. Taking the square roots of these percentages results in upper and lower bounds on Rho.

Rho squared error is introduced into the simulation using the parameter 'c'. Two values will be assigned, .1 and .2. The .1 value was the basis of the above example, where the bound on Rho squared for a possible 10% error (± 5%) in total explained variation. The simulation model 'splits' the 'p' value equally around the Rho squared for the 'normal' case. Any bounds which fall outside of the 0 and 1 interval for Rho squared are truncated to 0 or 1.

The lower and upper bounds on Rho can be used to calculate a total system variance which is consistently higher or lower than the total system variance for the 'normal' case. Recall that the total system variance is calculated by summing all system variance and covariance terms. Therefore, given constant variances, the total system variance is affected by the changing only values of the covariance terms. The covariance was defined in Eq (3.19) as $Cov(X_i,X_j) = R_{X_iX_j} [Var(X_i) Var(X_j)]^{\frac{1}{2}}$. From this equation, the covariance for each component pair is maximized when positive Rhos assume their highest magnitude and negative Rhos assume their lowest. Similarly, covariance is minimized when positive and negative Rhos assume their lowest and highest values, respectively. If the upper and lower Rho values for each component pair are used accordingly in the computation of the total system variance, the resultant output distributions reveal the highest and lowest possible deviations of total system variance from the 'normal' case.

Large overlaps between the 'normal' and 'low' and between the 'normal' and 'high' distributions indicate only minor sensitivity to Rho estimating error. If the model produces 'low' and 'high' distributions that are close enough to the 'normal case', then the methodology may be applicable to real systems with predominantly similar characteristics. However, the model may reveal that predictions of total system cost variance deviate unacceptably when Rhos

are slighlty inaccurate. This tells us that the methodology requires further refinement, or that it should be selectively applied to only the most 'forgiving' systems.

Overlap of the 'low' and 'normal' distributions will be measured by counting the number of observations on the 'low' distribution that appear above the 5, 10, and 15 percentiles of the 'normal' case. Overlap of the 'high' and 'normal' distributions will be measured by counting the number of observations on the 'high' distribution that fall below the 95, 90, and 85 percentiles of the 'normal' case. This technique provides the researchers with a standard measure of overlap for the 54 systems without making any assumptions about the shape of their three variance distributions. It also provides a 'well-behaved' measurement that is not sensitive to the location of 'rare events' in the 'normal' case.

A decision rule is needed to determine what constitutes 'significant' overlap within the six percentiles on the 'normal' distribution. The authors feel that the standards in Table 3.3 are reasonable. Our intention is to determine how well each system, on the whole, overlaps the 'normal' case. The above criteria yields six standards for each of the 54 systems, however, the authors do not want a proliferation of standards to 'mask' the results. For this reason, we choose three criteria to measure each system's performance against the standards.

Table 3.3

Acceptance Standards

'normal' percentile	% of 'low' observations above %tile	% of 'high' observations below %tile
.05	70%	-
.10	60%	-
.15	50%	-
.95	-	70%
.90	-	60%
.85	-	50%

Criteria #1 is the most stringent of the three. It describes only those systems which meet all six of the standards in Table 3.3. This criteria identifies those systems for which the proposed risk assessment methodology has strong predictive ability. Criteria #2 describes those systems with both 'high' and 'low' distributions that meet at least two of their three standards. In other words, neither the 'high' nor 'low' distributions can fail to meet more than one standard. The risk assessment methodology is moderately able to predict total system cost variance for these systems. Those systems which met Criteria #1 are excluded from this category. Criteria #3 describes all other systems. For these systems, the proposed methodology exhibits its weakest application potential.

Because the selection of standards is subjective, the researchers feel that a second set of standards will strengthen the reliability of the findings. The second set

of standards will be similar to those in Table 3.3, except that the percentage of overlap for each percentile will be 'loosened' by 20 percent (50%, 40%, 30%). Criterion #1, #2 and #3 will also be applied to this set of standards. Hopefully, this approach will lend better visibility to any trends that might not emerge with a more rigid standard.

Conclusion

This chapter has outlined the methodology that will be used to incorporate component dependency into an assessment of total system cost variance. The underlying statistical framework was developed as well as a technique to apply those concepts. A validation methodology of the risk assessment technique was proposed. The following chapter analyzes the results of this methodolgy.

IV. Analysis

This chapter will apply the research methodology developed in the previous chapter to assess the results of the simulation. The data that is generated will be used to assess the need for the incorporation of component dependence in cost-risk assessment. The final portion of the chapter is devoted to a discussion of the internal validity of the model and its implications for the cost analyst.

The simulation was performed for each of the possible system configurations in Chapter 3, Table 2. The output files of the Fortran simulation (OUT1 - OUT54) were input into the BMDP statistical package which sorted the total system cost variances for the 'low', 'normal', and 'high' distributions, plotted histograms of these distributions, and provided pertinent statistical information (6:74-78,112-113, 124-132). The BMDP filenames (RUN1 - RUN54) are listed in Table 4.1, below, with a list of the parameters that were modeled. The BMDP code is found in Appendix C. The histograms are provided in Appendix D.

Ratio of Variances

As mentioned in Chapter 3, the ratio of variances was used as a measure of the significance of component dependence in cost-risk assessment. Table 4.2 gives the total cost variance assuming independence for each system and summarizes

the calculations for the ratio of variances.

Table 4.1

System Configurations by Run Number

e = .2			n = 5	e = .1		
RUN#	m	p		RUN#	m	p
1	.500	1.0		10	.500	1.0
2	.500	.75		11	.500	.75
3	.500	.50		12	.500	.50
4	.707	1.0		13	.707	1.0
5	.707	.75		14	.707	.75
6	.707	.50		15	.707	.50
7	.866	1.0		16	.866	1.0
8	.866	.75		17	.866	.75
9	.866	.50		18	.866	.50

e = .2			n = 50	e = .1		
RUN#	m	p		RUN#	m	p
19	.500	1.0		28	.500	1.0
20	.500	.75		29	.500	.75
21	.500	.50		30	.500	.50
22	.707	1.0		31	.707	1.0
23	.707	.75		32	.707	.75
24	.707	.50		33	.707	.50
25	.866	1.0		34	.866	1.0
26	.866	.75		35	.866	.75
27	.866	.50		36	.866	.50

Table 4.1 (continued)

System Configurations by Run Number

e = .2			n = 100	e = .1	
RUN#	m	p	RUN#	m	p
37	.500	1.0	46	.500	1.0
38	.500	.75	47	.500	.75
39	.500	.50	48	.500	.50
40	.707	1.0	49	.707	1.0
41	.707	.75	50	.707	.75
42	.707	.50	51	.707	.50
43	.866	1.0	52	.866	1.0
44	.866	.75	53	.866	.75
45	.866	.50	54	.866	.50

Based on the acceptance criteria described in Chapter 3, component dependence is considered significant when the ratio of variances is less than .64 or greater than 1.44. Table 4.2 reveals that component dependence is significant in a majority of the systems that were modeled. Closer examination of the table shows several trends. The first trend has to do with the number of components in the system, 'n'. The rows of Table 4.2 show identical system configurations except for the number of components. The ratios across each row tend to be clustered near the same value. These results indicate that system size does not significantly affect the movement of total system cost var-

iance away from the independent case. This implies that the number of system components should not affect the decision to model component dependence in cost-risk assessments.

Table 4.2

Ratio of Variances*

n = 5		n = 50		n = 100	
VAR = 336		VAR = 2339		VAR = 4616	
RUN	Ratio	RUN	Ratio	RUN	Ratio
1&10	1.71	19&28	1.81	37&46	1.85
2&11	1.38	20&29	1.40	38&47	1.43
3&12	1.03	21&30	1.00	39&48	1.00
4&13	1.82	22&31	1.92	40&49	1.97
5&14	1.50	23&32	1.46	41&50	1.49
6&15	1.03	24&33	1.00	42&51	1.00
7&16	1.90	25&34	2.01	43&52	2.06
8&17	1.54	26&35	1.50	44&53	1.53
9&18	1.03	27&36	1.00	45&54	1.00

* Because the calculations for this table were based on the 'normal'case, Rho estimation error does not affect the ratios for these runs.

Caution should be taken, however, in generalizing this conclusion to systems with a WBS hierarchy. The conclusion that system size is insignificant seems to be more limited to the simplified systems that this research addressed. To illustrate, consider a 30 component system whose depend-

encies have been simplified by the linear dependence assumption. The ratio of the dependent and independent variances for this system is shown in Eq (4.1).

$$\text{Ratio} = \left[\sum_{i=1}^{30} Var(X_i) + 2 \sum_{i=2}^{30} Cov(X_{i-1}, X_i) \right] / \sum_{i=1}^{30} Var(X_i) \quad (4.1)$$

Suppose that the system size is increased by one component. The new ratio of the cost variances is shown in Eq (4.2).

$$\text{Ratio} = \left[\sum_{i=1}^{30} Var(X_i) + 2 \sum_{i=2}^{30} Cov(X_{i-1}, X_j) + Var(X_{31}) + 2\,Cov(X_{30}, X_{31}) \right] / \left[\sum_{i=1}^{30} Var(X_i) + Var(X_{31}) \right] \quad (4.2)$$

The numerator of the ratio is increased by the variance of the new component plus twice the covariance between the new component and its immediate predecessor. The denominator of the ratio is increased by the variance for the new component.

System size has a greater affect on the ratio of the two cost variances when the syetem is defined by a WBS hierarchy. Eq (4.3) shows the ratio for the 30 component system which has been enlarged by the additional component. Comparing Eqs (4.3) and (4.2) shows that adding another component may have a significantly greater affect when there are no constraints placed on the covariance terms.

$$\text{Ratio} = \left[\sum_{i=1}^{30} \text{Var}(X_i) + \sum_{i=1}^{30} \sum_{j=1}^{30} \text{Cov}(X_i, X_j) + \text{Var}(X_{31}) \right.$$
$$+ \sum_{i=1}^{30} \text{Cov}(X_i, X_{31}) + \left. \sum_{j=1}^{30} \text{Cov}(X_{31}, X_j) \right]$$
$$/ \left[\sum_{i=1}^{30} \text{Var}(X_i) + \text{Var}(X_{31}) \right] \quad (4.3)$$

The denominator of both equations increased by the same amount, however, the numerator of Eq (4.3) may increase significantly more than the numerator of Eq (4.2). The numerator of Eq (4.3) includes not only another variance term, but also the sum of 60 covariance terms, as opposed to 2 additional covariance terms in Eq (4.2). This could make a significant difference.

Since the results in Table 4.2 are not sensitive to system size, only Column 1 of the table will be used in order to simplify the remaining discussion. Although only the n=5 system will be illustrated, the following trends also apply to the systems with 50 and 100 components.

The first trend deals with the relationship between the proportion of positive rhos, 'p', and the mode of the triangular distribution, 'm', which produced the Rho values. Table 4.2, Column 1 is reproduced below along with the corresponding values of 'm' and 'p'. High proportions of positive Rhos consistently produced higher deviations of total system cost variance from the independent case. This is evident by the high ratios for RUN1, RUN4, and RUN7 when p=1.0 .

Table 4.3

m and p Values for RUN1-RUN9

Run	Ratio	m	p
1	1.71	.500	1.00
2	1.38	.500	.75
3	1.03	.500	.50
4	1.82	.707	1.00
5	1.50	.707	.75
6	1.03	.707	.50
7	1.90	.866	1.00
8	1.54	.866	.75
9	1.03	.866	.50

As this proportion decreases, so does the ratio of variances. A decrease in 'p' from 1.0 to .75 changes the ratio for RUN4 from 1.8 to 1.5. The ratios for RUNs 1 and 7 also changed by approximately .3. A reduction in the proportion from .75 to .50 changes the ratio for RUN 5 from 1.5 to 1.0. A similar decrease is evident in RUNs 2 and 8.

These results can be explained by recalling that the only difference between the dependent and independent total system cost variances is the inclusion of the covariance terms. If the sum of the covariance terms significantly deviates from zero, a difference in the ratio of the two

variances will result. The sum of the covariance terms is very sensitive to the proportion of those covariances which are positive. When the proportion is large, there are relatively few negative covariance terms to offset the increase in the total system cost variance caused by the positive covariances. As shown in Table 4.3, when half of the Rhos were positive, the results closely approximate the independent system for all values of the mode used to generate the Rhos.

Comparison of RUNs (1-3), RUNs (4-6), and RUNs (7-9) demonstrates the influence of the mode of the triangular distribution on the ratio of variances. Higher values of Rho consistently produce greater deviations from the independent total system cost variance. These results are explained by recalling the relationships in Eq (3.19). For component pairs and their associated variances

$$Cov(X_i, X_j) = R_{X_i X_j} \left[Var(X_i) \; Var(X_j) \right]^{\frac{1}{2}} \qquad (3.19)$$

The magnitude of Rho, as modeled by the mode, determines the magnitude of the covariance terms. With other model parameters held constant, large magnitudes of Rho (+ or -) drive the magnitude of the sum of the covariances. As mentioned above, as the sum of the covariances deviates from zero, the ratio of total system cost variances will deviate from 1.

Stepwise changes in 'm' from .5 to .707 and from .707 to .866 increase the ratio of the variances between runs by

approximately .1. For example, the ratio for RUNs 1, 4, and 7 are 1.7, 1.8, and 1.9, respectively. Each of these step-wise changes in the mode represent an increase in total explained variation of 25% (Reference Chapter 3, Table 1).

For the relevant ranges of the proportion of positive Rhos and modal values chosen in this simulation, total system cost variance is more sensitive to the proportion of positive Rhos, 'p', than to the range of mode values. Table 4.3 shows that varying 'p' from its lowest to highest value (in increments of 25%) increases the variance ratio by approximately .8. Varying 'm' from its lowest to highest values (in increments of 25% of explained variation) increases the ratio by only .2. This result has a favorable implication for the cost-risk assessment method. In the 'real world', determination of the direction of component dependency should be easier to subjectively assess than the exact magnitude of the dependence relationship.

Internal Validity

The high and low overlap percentages generated by the validation model are displayed in Appendix E. These values were compared to the standards and acceptance criteria that were presented in the previous chapter. The results of the first standard (70-60-50) are displayed in Table 4.4.

The purpose of this section is to determine the ability to predict total system cost variance when subjective estimates for Rho squared are in error. This parameter, 'e',

was given two values, .2 and .1. As expected, more runs had acceptable overlap when e=.1 than when e=.2 . This makes sense intuitively, since one would expect a better estimate of the total system cost variance when the value for Rho was estimated with greater accuracy. In Table 4.4, Matrices 2, 4, and 6 were generated when the Rho squared error was .1 and Matrices 1, 3, and 5 were generated with the error at .2. There are 18 of 27 runs that met Criteria #1 when e=.1 . Only 8 of 27 runs have met this criteria when p=.2 . As the program personnel's ability to subjectively estimate component dependence increases, the ability of the cost-risk assessment method to accurately estimate total system cost variance increases significantly.

While R^2 error is the parameter used to assess internal validity, the other model parameters influence the applicability of the method. Looking again at Table 4.4, the first column in each matrix, except Matrix 2, shows a consistent weakness in predicting total system cost variance. Whether R^2 error is .1 or .2, the cost-risk assessment method loses predictive capability as the proportion of positive dependencies approaches 1.0. The number of components in the system also appears to affect the accuracy of the methodology. When 'n' is low, the predictive capability of the method is at its best. This is shown by the large number of systems in Matrices 1 and 2 that meet Criteria #1.

Table 4.4

Internal Validity Result Matrix

Standard: 70-60-50

MATRIX 1

n=5, e=.2

m \ p	1.0	.75	.50
.500	1	2*	3*
.707	4	5*	6*
.866	7	8*	9*

MATRIX 2

n=5, e=.1

m \ p	1.0	.75	.50
.500	10*	11*	12*
.707	13*	14*	15*
.866	16*	17*	18*

MATRIX 3

n=50, e=.2

m \ p	1.0	.75	.50
.500	19	20	21
.707	22	23	24*
.866	25	26**	27*

MATRIX 4

n=50, e=.1

m \ p	1.0	.75	.50
.500	28	29*	30*
.707	31	32*	33*
.866	34	35*	36*

MATRIX 5

n=100, e=.2

m \ p	1.0	.75	.50
.500	37	38	39
.707	40	41	42
.866	43	44	45

MATRIX 6

n=100, e=.1

m \ p	1.0	.75	.50
.500	46	47	48
.707	49	50**	51*
.866	52	53*	54*

* meets Criteria #1

** meets Criteria #2

note: no entry means the system meets criteria #3

However, as system size increases, the number of runs that meet the criteria decreases in Matrices 3 and 4, and again in Matrices 5 and 6. Finally, the strength of the component dependencies, as described by the mode, appears to have a limited effect on predicting total system cost variance. As 'm' increases from .5 to .866, in all six matrices, slightly more runs meet Criteria #1.

Table 4.4 reveals that only a limited number of systems met Criteria #2. So few, in fact, that little information regarding trends in the performance of the method can be ascertained.

Criteria #3 shows the systems for which the method has limited ability to accurately predict total system cost variance. Since so few systems met the second criteria, systems described by Criteria #3 are basically the reverse of those described by Criteria #1. The same trends presented in the previous discussion hold true and will not be reiterated.

The results of the comparison of the 54 systems to the second standard are shown in Table 4.5. Notice that the trends mentioned in the previous two paragraphs hold true. This consistency adds to the reliability of the conclusions. One noteworthy occurrence is the drastic increase in the number of systems that meet Criteria #1 for Matrices 3 and 6. A lowering of the standard tripled the number of systems that met the first criteria.

Table 4.5

Internal Validity Result Matrix

Standard: 50-40-30

MATRIX 1

n=5

e=.2

m	p: 1.0	.75	.50
.500	1*	2*	3*
.707	4**	5*	6*
.866	7*	8*	9*

MATRIX 2

n=5

e=.1

m	p: 1.0	.75	.50
.500	10*	11*	12*
.707	13*	14*	15*
.866	16*	17*	18*

MATRIX 3

n=50

e=.2

m	p: 1.0	.75	.50
.500	19	20*	21*
.707	22	23*	24*
.866	25	26*	27*

MATRIX 4

n=50

e=.1

m	p: 1.0	.75	.50
.500	28	29*	30*
.707	31*	32*	33*
.866	34*	35*	36*

MATRIX 5

n=100

e=.2

m	p: 1.0	.75	.50
.500	37	38	39
.707	40	41	42**
.866	43	44*	45*

MATRIX 6

n=100

e=.1

m	p: 1.0	.75	.50
.500	46	47*	48*
.707	49	50*	51*
.866	52	53*	54*

* meets Criteria #1
** meets Criteria #2
note: no entry means the system meets criteria #3

In spite of the increase in the number of systems meeting Criteria #1 in Matrices 3 and 6, no systems meet the criteria for Column #1 in these matrices when the proportion of positive Rhos was 1.0. This reinforces the earlier point that the cost-risk assessment method has poor predictive capabilities when p=.1 .

Consistent with Table 4.4, Table 4.5 has only two systems meeting Criteria #2. The minimal number of systems meeting this criteria is significant. Since so few systems meet this criteria of moderate predictive ability, one conclusion is that the method tends to have either very strong or very limited predictive capabilities. This is true even when the two standards used to define acceptable overlap were significantly different. This conclusion is overwhelmingly supported by the data.

In general, the cost-risk assessment method, incorporating component cost dependence, predicts total system cost variance with relatively good accuracy when the error in Rho squared is .1. It does not do as well when the error is .2. Values of 'e' greater than .2 would indicate that R^2 values are mis-estimating more than 20% of the total system variation. To estimate total system cost variance when R^2 error is greater than .2 would be accepting entirely too large an error into the methodology. When the percentage of positive covariance values approaches 1.0, the method consistently predicts poorly. However, systems with all positive cost dependencies are highly unlikely. In the researcher's

opinion, a much more likely scenario would have 50% to 75% positive cost dependencies. With this situation, the predictive capabilities of the cost-risk assessment method are much better. Another expected result is the effect of system size on the predictive capabilities of the method. As 'n' increases, the estimation error for R^2 is compounded and estimates of total system cost variance are further distorted. The mode value influences total system cost variance in small amounts. The higher the value, the higher the error in the estimate of total system cost variance. Finally, the lack of system configurations that fell into the second criteria for both standards indicates that there are clearly situations in which the method has strong predictive abilities and situations in which the method has weak predictive capabilities. This result enhances the value of the method because it defines the situations where the method can be used with confidence. The pronounced division in the number of systems meeting Criterion #1 and #2 may be caused by the rather 'crude' incrementing of the model parameters chosen for the sensitivity analysis. Modelling smaller incremental changes in these parameters may identify more situations with moderate predictive capability. It is interesting to note that the method may even be usable in situations where it has poor predictive capabilities. As the proportion of positive covariance terms approaches 1.0, the method predicts total system cost variance with less accuracy. The results from the ratio of the

variances indicate that the incorporation of component depedency becomes most important when the proportion of positive component dependencies approaches 1.0. The method is needed the most when it is least effective. However, even though the methods predictive abilities are not at their best, the method is still accounting for an increase in the total system cost variance that is not accounted for when independence is assumed.

V. Conclusions and Recommendations

Conclusions

The results from this research indicate that component cost dependency should be an important consideration in the cost-risk assessment process. The simulation revealed that for the majority of the system configurations, component dependency caused the total system cost variance to significantly deviate from its value under conditions of component independence. This finding indicates that weapon system acquisitions that assume component independence are likely to significantly misestimate the total system cost variance. The impact is the potential misallocation of scarce resources.

There were several trends that became evident when comparing dependence against independence using the cost-risk assessment method developed in this research. The proportion of the positive cost dependencies in a system clearly had the stongest influence over the difference between the dependent and independent system configurations. The greater the proportion of positive dependencies in the system, the greater the difference between the total system cost variances. As the strength of the cost dependencies was increased, the difference between the independent and dependent system variances increased. However, the increase was small relative to that increase which occurred when the

proportion of positive cost dependencies was increased. Changes in the size of the system did not appear to affect the ratio of the dependent and independent variances. However, the researchers believe this result is due to the limiting assumption of sequential component dependencies. As this restriction is relaxed, the number of component dependency pairings increases and could significantly affect the ratio of the variances. Sensitivity analysis was performed on the method to evaluate its ability to predict total system cost variance under conditions of Rho squared estimation error. Results show that the method predicts total system cost variance fairly accurately when R^2 estimation error was limited to .1. As the R^2 estimation error grew to .2, the method did not predict as well. The researchers consider a .1 error in estimating R^2 to be very good, yet even this small amount of error does not guarantee prediction of the total system cost variance. When the number of components in the system or the proportion of the positive cost dependencies is large, the predictive ability of the cost-risk assessment method is not very accurate. However, these inaccuracies may be tolerable when the consequence of ignoring component dependence is considered. The researchers found that those situations where the variance was difficult to predict were the situations with the greatest need to incorporate dependence. The potential impact of each error would have to be weighed.

Limitations

The research was limited in several ways. Although subjective assessments of component dependence will always include some degree of error, the technique used to quantify these assessments will introduce additional error. This is particularly true for the 'descriptive category' technique described in Chapter 3. The analyst has wide latitude in assigning Rho values to each category.

The simulation only tested a limited number of system configurations. Many scenarios that occur in the real world were left out. In particular, wider ranges and more parameter settings are needed to test the effects of negative component dependence, a larger range of rho values, and the more system sizes.

The manner in which the Rho values were generated is also a weakness in the research. Both positive and negative Rho values were generated from the same distribution. This assumes that the magnitudes of both the positive and negative Rho values have an equal likelihood of occurrence. In a real system, this situation is unlikely. Rather, strong positive relationships may be more likely to be accompanied with weak negative ones in the system.

Recommendations

The authors feel that further research should be conducted with this cost-risk assessment methodology. The following areas are recommended:

1. Sensitivity analysis should be performed to examine the scenarios that were not examined here. A clearer identification of those situations with moderate prediction capability is needed.

2. Better techniques to solicit and convert subjective assessments into measures of dependency would improve the methodology. The use of conditional probabilities is one possible approach to consider.

3. Extension of this methodology should be applied to a WBS hierarchy to compare the trends which were discussed in this thesis.

Appendix A: Calculation of Sample Size

Banks and Carson describe a procedure for determining the required number of simulation repetitions. A two-sided confidence interval for the mean of a distribution, $\bar{x}$, based on the Students t distribution is given by:

$$\bar{x} \pm [(t)(s / r^{\frac{1}{2}})] \quad \text{(A.1)}$$

where

t = critical value for t distribution
s = sample standard deviation of x
r = number of simulation repetitions

The precision of the confidence interval is specified so that it estimates the true mean within a tolerable error, $\pm\epsilon$, and with a desired level of confidence. Therefore, from Eq (A.1)

$$\epsilon \geq (t)(s / r^{\frac{1}{2}}) \quad \text{(A.2)}$$

The number of repetitions required to achieve an estimate of the mean within $\pm\epsilon$ accuracy is determined by choosing an initial number of repetitions. The required number of repetitions is then solved by manipulating Eq (A.2) as follows:

$$\epsilon \geq (t)(s / r^{\frac{1}{2}}) \quad \text{(A.2)}$$

$$r^{\frac{1}{2}} \geq (t)(s / \epsilon) \quad \text{(A.3)}$$

$$r \geq [(t)\ (s\ /\ \epsilon)]^2 \qquad (A.4)$$

The number of repetitions is calculated using the standard deviation from the inital sample, the critical t value, and the desired accuracy (1:427). Generally, a few iterations of Eq (A.4) are required in order to adjust the t value as the degrees of freedom change with the number of repetitions thdt is calulated (1:426-427).

The authors selected 50 initial repetitions for the five component system and 100 for the fifty and one hundred component systems. A 95% confidence level seemed reasonable and the amount of tolerable error was subjectively established at 50, roughly half the sample standard deviation for the five component system (s=110). The mode for the triangular distribution, the proportion of positive rhos, and the rho squared estimation error were set to: m=.707 , p=.75 , and e=.1 . The 'normal' case was used as the basis for the calculations.

For the 5 component system, solving Eq (A.4) revealed that 20 repetitions were sufficient.

$$r \geq [(t)\ (s\ /\ \epsilon)]^2 \qquad (A.4)$$

$$r \geq [(2.02)\ (110\ /\ 50)]^2$$

$$r \geq 20$$

However, 50 repetitions were selected for the 5 component system in order to provide a smoother histogram. From Eq

(A.2), the error for the 5 component system is reduced from 50 to 31 when $r=50$. The sample standard deviations for the 50 and 100 component systems were 373 and 545, respectively. Applying the above procedure, the calculated sample sizes were 213 and 456 for $n=50$ and $n=100$, respectively.

As discussed in Banks and Carson, the model is run with this number of repetitions and adjustments are made for the new sample standard deviation (1:427). The results of these calculations yielded $r=229$ and $r=393$. These values were rounded. The number of repetitions used in this research is shown in Table A.1.

Table A.1

Simulation Replications

number of system components	number of simulation repetitions
5	50
50	230
100	400

Appenndix B: Simulation Program

The following section of the Fortran code declares these real and integer variables and arrays:

ARRAY	PURPOSE
var	Stores component variances
sign	Stores random numbers (uniformly distributed 0-1) used to determine the sign of rho values
numb	Stores random numbers (uniformly distributed 0-1) used to calculate magnitude of rho values
rl	Stores low Rho for component pairs
rn	Stores normal Rho for component pairs
rh	Stores high Rho for component pairs
covl	Stores covariance computed with low Rho
covn	Stores covariance computed with normal Rho
covh	Stores covariance computed with high Rho
seeds	Stores random numbers (uniformly distibuted 0-1) to be used as random number stream seeds

VARIABLE	IDENTITY
covsl	Sum of low covariances
covsn	Sum of normal covariances
covsh	Sum of high covariances
vars	Sum of component variances
tsvl	Total system variance-low
tsvn	Total system variance-normal
tsvh	Total system variance-high
ix	Initial random number stream seed

iy	Dummy variable for random number generation
yfl	Random number generated by subroutine
ayfl	Dummy variable used for arithmetic operations on random number
m	Mode of triangular distribution of rho values
e	Rho estimation error
p	Proportion of positive rho values
n	Number of system components
r	Number of simulation repetitions (Appendix A)
rnsq	Rho-normal squared
i	Counter
k	Counter

```
c     program 1.f
      real var(100),sign(99),numb(99),rl(99),rn(99),rh(99),
     *covl(99),covn(99),covh(99),seeds(400),covsl,covsn,
     *covsh,vars,yfl,tsvl,tsvn,tsvh,m,ayfl,rnsq,e,p
      integer ix,iy,n,i,k,r
```

The following segment opens a file where the output of the simulation is stored and sets the system parameters as described in Chapter 3. Files out1-out54 were used.

```
      open (6,file='out37')
      rewind 6
      p=1.0
      e=.2
      n=100
      m=.5
      r=400
```

This section calls the random number generator (subroutine

RANDU) and initializes the random number stream seed.

```
      iy=0
      ix=83647
      yfl=0.0
      call randu(ix,iy,yfl)
```

This loop calls the RANDU subroutine to generate random numbers that will be converted to a different 5 digit integer random number stream seed for each simulation repetition. This is to ensure that the simulation results are not autocorrelated (1:391).

```
      do 20 i=1,r
          ix=iy
          call randu(ix,iy,yfl)
          ayfl=int(yfl*100000)
          seeds(i)=ayfl
20    continue
```

This loop calls the subroutine to generate random numbers that are used for component variance values (0-100). These variances are held constant for all iterations of a given system and are identical for all simulations of equal component size.

```
      do 30 i=1,n
          ix=iy
          call randu(ix,iy,yfl)
          ayfl=yfl*100
          var(i)=ayfl
30    continue
```

This section begins the loop for iterations of the defined system and initializes the sum of variances, covariances, and total system variance to 0.

```
      do 1000 k=1,r
          vars=0.0
          covs1=0.0
          covsn=0.0
          covsh=0.0
          tsv1=0.0
          tsvn=0.0
          tsvh=0.0
```

This segment initializes the random number stream to a new value for each repetition.

```
      iy=0
      ix=seeds(k)
      yf1=0.0
      call randu(ix,iy,yf1)
```

This loop loads an array with random numbers for each component pair. These numbers are also non-autocorrelated and will determine which component pairs have negative correlation.

```
      do 40 i=1,(n-1)
          ix=iy
          call randu(ix,iy,yf1)
          sign(i)=yf1
40    continue
```

The following loop loads an array with random numbers for

each component pair. These numbers will be used to calculate non-autocorrelated Rho values based on a triangular distribution.

```
      do 50 i=1,(n-1)
          ix=iy
          call randu(ix,iy,yfl)
          numb(i)=yfl
50    continue
```

This section transforms the random numbers in array 'numb' into a Rho value for each component pair. Banks and Carson use the cumulative distribution function (c.d.f.) to transform the random number into a random variate of the triangular distribution. The c.d.f. for a triangular distribution on the interval (0,1) is:

$$F(x) = \begin{cases} 0, & x \leq 0 \\ x^2 / m, & 0 < x \leq m \\ [1- (1-x)^2] / (1-m), & m < x \leq 1 \\ 1, & x > 1 \end{cases} \qquad (B.1)$$

where

m = mode of triangular distribution
x = rho value on the distribution

Eq (B.1) is then set equal to the random number, 'numb' for each interval of the random variate. For $0 \leq x \leq m$:

$$numb = x^2 / m \qquad (B.2)$$

For $m < x \leq 1$:

$$\text{numb} = [1 - (1-x)^2] \,/\, (1-m) \tag{B.3}$$

Therefore, Rho values (x) in the interval $0 \leq x \leq m$ implies that $0 \leq \text{numb} \leq m$. In this case, the Rho value for random numbers between 0 and m are calculated by rearranging Eq (B.2) as follows:

$$x^2 = (m)\,(\text{numb}) \tag{B.4}$$

$$x = [(m)\,(\text{numb})]^{\frac{1}{2}} \tag{B.5}$$

Rho values (x) in the interval $m < x \leq 1$ implies that $m < \text{numb} \leq 1$. The Rho value for random numbers between m and 1 are calculated from Eq (B.3) as follows:

$$(1-x)^2 \,/\, (1-m) = 1 - \text{numb} \tag{B.6}$$

$$(1-x)^2 = (1-m)\,(1-\text{numb}) \tag{B.7}$$

$$(1-x) = [(1-m)\,(1-\text{numb})]^{\frac{1}{2}} \tag{B.8}$$

$$-x = -1 + [(1-m)\,(1-\text{numb})]^{\frac{1}{2}} \tag{B.9}$$

$$x = 1 - [(1-m)\,(1-\text{numb})]^{\frac{1}{2}} \tag{B.10}$$

To summarize the transformation:

$$x = \begin{cases} [(m)\,(\text{numb})]^{\frac{1}{2}}, & 0 \leq \text{numb} \leq m \\ 1 - [(1-m)\,(1-\text{numb})]^{\frac{1}{2}}, & m < \text{numb} \leq 1 \end{cases} \tag{B.11}$$

(1:158,299-300)

```
------------------------------------------------------------
      do 60 i=1,(n-1)
          if(numb(i) .ge. 0.0 .and. numb(i) .le. m) then
             rn(i)=sqrt(m*numb(i))
          else
             rn(i)=1.0-sqrt((1.0-m)*(1.0-numb(i)))
60    continue
------------------------------------------------------------
```

This loop changes the Rho to a negative value for component pairs when 'sign' random number is greater that the identified proportion of positive Rhos.

```
------------------------------------------------------------
      do 70 i=1,(n-1)
          if (sign(i) .gt. p) then
             rn(i)=-rn(i)
          end if
70    continue
------------------------------------------------------------
```

The next loop checks the Rho values and assigns upper and lower Rho limits based on the sign of rho and the amount of Rho squared estimation error. The Rho limit which produces the lower total system variance is assigned to array 'rl', the other limit is assigned to array 'rh'. Rho limits that are outside the interval (0,1) are truncated to the appropriate limit, 0 or 1. An example of this procedure is given in Chapter 3.

```
------------------------------------------------------------
      do 80 i=1,(n-1)
          if (rn(i) .ge. 0.0) then
             rnsq=rn(i)**2
                  if (0.0 .gt. (rnsq-e/2)) then
                       rl(i)=0.0
                       rh(i)=sqrt(rnsq+e/2)
                  else if ((rnsq+e/2) .gt. 1.0) then
                       rl(i)=sqrt(rnsq-e/2)
                       rh(i)=1.0
```

```
                else
                     rl(i)=sqrt(rnsq-e/2)
                     rh(i)=sqrt(rnsq+e/2)
                end if
        else if (rn(i) .lt. 0.0) then
           rnsq=rn(i)**2
                if (0.0 .gt. (rnsq-e/2)) then
                     rh(i)=0.0
                     rl(i)=-sqrt(rnsq+e/2)
                else if ((rnsq+e/2) .gt. 1.0) then
                     rh(i)=-sqrt(rnsq-e/2)
                     rl(i)=-1.0
                else
                     rh(i)=-sqrt(rnsq-e/2)
                     rl(i)=-sqrt(rnsq+e/2)
                end if
        end if
80    continue
```

The following section uses the normal, low, and high rho values for each component pair and their associated variances to calculate the normal, low, and high covariance values.

```
      do 90 i=1,(n-1)
          covl(i)=rl(i)*sqrt(var(i)*var(i+1))
          covn(i)=rn(i)*sqrt(var(i)*var(i+1))
          covh(i)=rh(i)*sqrt(var(i)*var(i+1))
90    continue
```

This loop sums the variances for all system components.

```
      do 100 i=1,n
          vars=vars+var(i)
100   continue
```

This loop sums the normal, low, and high covariances for all component pairs.

```
      do 110 i=1,(n-1)
           covsl=covsl+covl(i)
           covsn+covsn+covn(i)
           covsh=covsh+covh(i)
110 continue
```

This segment calculates the normal, low, and high total system variance. Covariance sums are multiplied by 2 as discussed in Chapter 3. The output is written to the file identified in the OPEN statement at the beginning of the program. Program execution loops back for another repetition of the same system until r repetitions have been performed.

```
      tsvl=vars+2*covsl
      tsvn=vars+2*covsn
      tsvh=vars+2*covsh

      write(6,7)tsvl,tsvn,tsvh
7     format(3(f6.0,x))

1000  continue
```

After the final repetition is complete, the output file is closed and program execution halts.

```
      close (6)
      end
```

The RANDU subroutine generates all random numbers required by the simulation.

```
      subroutine randu(ix,iy,yfl)
      iy=ix*65539
      if (iy)5,6,6
5     iy=iy+2147483647+1
6     yfl=iy
      yfl=yfl*.4656613e-9
      return
      end
```

Appendix C: BMDP Programs

The University of California at Los Angeles (UCLA) BMDP statistical package was used to provide the histograms and the sorting procedure that aided the data analysis (6:43, 74-78, 112-113, 124-132). The following programs were used to perform their respective functions.

Program 1: Histograms

The variable names tsvl, tsvn, and tsvh correspond to those used in the simulation program discussed in Appendix B.

```
-----------------------------------------------------------------
/problem        title is 'run54'.
-----------------------------------------------------------------
```

The problem paragraph states the title of the BMDP execution program. In this case the name of the program is run54.

```
-----------------------------------------------------------------
/input          variables are 3.
                format is '(3(f6.0,x))'.
-----------------------------------------------------------------
```

This portion of the program, the input paragraph, states the number and format of variables to be read in as data.

```
-----------------------------------------------------------------
/variable       names are tsvl,tsvn,tsvh.
                blanks are zero.
-----------------------------------------------------------------
```

The variable paragraph names the variables so that they

may be identified in the output. The second line of code makes the package read all blank spaces in the data as zeroes.

```
-----------------------------------------------------------------
/group          cutpoints (1) = 2300 to 5800 by 175.
                cutpoints (2) = 2650 to 6150 by 175.
                cutpoints (3) = 3175 to 6675 by 175.
-----------------------------------------------------------------
```

The group paragraph sets the intervals for the histograms. (1) represents tsv1, (2) represents tsvn, and (3) represents tsvh. The high and low values were determined by the sort program to be discussed below. A value consistent within each run is used to specify the width of each interval. In the case of run54, 175 is the interval width.

```
-----------------------------------------------------------------
/plot           type is hist.
                scale is 0,3.
-----------------------------------------------------------------
```

The plot paragraph specifies that a histogram will be plotted. The second line indicates that zero is the low value on the histograms and that each 'X' on the histogram represents three data points.

```
-----------------------------------------------------------------
/end
-----------------------------------------------------------------
```

This ends the program. After this statement, the data is listed in the format described in the input paragraph.

Program 2: Sorting

This program is the same as the histogram program with some changes. The problem and variable paragraphs remain the same. The following code is added to the input paragraph.

```
/input          variables are 3.
                format is '(3(f6.0,x))'.
                sort is tsvn, tsvl, tsvh.
```

The sort statement has the tsvn variable name first to give it precedence in the sort since it is the critical data column.

Instead of a plot paragraph, a print paragraph was used to display the sorted data.

```
/print          data.
                order.
```

Appendix D: Histograms for RUN1-RUN54

This Appendix contains the BMDP-generated histograms for RUN1-RUN54. The histograms show the 'low', 'normal' and 'high' distributions of total system cost variance for each RUN number.

```
               run1

HISTOGRAM OF VARIABLE     2 tsvn
                                 SYMBOL   COUNT      MEAN       ST.DEV.
                                   X        5Ø     576.64Ø       4Ø.447
                         EACH SYMBOL REPRESENTS        1 OBSERVATIONS
INTERVAL                                                                                    FREQUENCY
NAME           5    1Ø   15   2Ø   25   3Ø   35   4Ø   45   5Ø   55   6Ø   65   7Ø   75   8Ø  INT. CUM.
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*49Ø.ØØØ +                                                                                   Ø    Ø
*5ØØ.ØØØ +X                                                                                  1    1
*51Ø.ØØØ +XX                                                                                 2    3
*52Ø.ØØØ +XX                                                                                 2    5
*53Ø.ØØØ +XX                                                                                 2    7
*54Ø.ØØØ +XXXXX                                                                              5   12
*55Ø.ØØØ +XX                                                                                 2   14
*56Ø.ØØØ +XXXX                                                                               4   18
*57Ø.ØØØ +XXXX                                                                               4   22
*58Ø.ØØØ +XXX                                                                                3   25
*59Ø.ØØØ +XXXXX                                                                              5   3Ø
*6ØØ.ØØØ +XXXX                                                                               4   34
*61Ø.ØØØ +XXXXXX                                                                             6   4Ø
*62Ø.ØØØ +XXX                                                                                3   43
*63Ø.ØØØ +XXXX                                                                               4   47
*64Ø.ØØØ +X                                                                                  1   48
*65Ø.ØØØ +                                                                                   Ø   48
*66Ø.ØØØ +X                                                                                  1   49
*67Ø.ØØØ +                                                                                   Ø   49
*68Ø.ØØØ +X                                                                                  1   5Ø
*LAST    +                                                                                   Ø   5Ø
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
               5    1Ø   15   2Ø   25   3Ø   35   4Ø   45   5Ø   55   6Ø   65   7Ø   75   8Ø
```

```
               run1

HISTOGRAM OF VARIABLE     1 tsv1
                              SYMBOL   COUNT      MEAN      ST.DEV.
                                X        50      507.700      52.554
                       EACH SYMBOL REPRESENTS          1 OBSERVATIONS
INTERVAL                                                                                   FREQUENCY
NAME          5   10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*390.000 +                                                                                    0    0
*400.000 +XX                                                                                  2    2
*410.000 +X                                                                                   1    3
*420.000 +                                                                                    0    3
*430.000 +                                                                                    0    3
*440.000 +X                                                                                   1    4
*450.000 +X                                                                                   1    5
*460.000 +XXXX                                                                                4    9
*470.000 +XXXX                                                                                4   13
*480.000 +XXX                                                                                 3   16
*490.000 +XXXX                                                                                4   20
*500.000 +XXXX                                                                                4   24
*510.000 +                                                                                    0   24
*520.000 +XXX                                                                                 3   27
*530.000 +XXXXX                                                                               5   32
*540.000 +XXXX                                                                                4   36
*550.000 +XXX                                                                                 3   39
*560.000 +XXX                                                                                 3   42
*570.000 +XXXX                                                                                4   46
*580.000 +X                                                                                   1   47
*590.000 +X                                                                                   1   48
*600.000 +                                                                                    0   48
*610.000 +X                                                                                   1   49
*620.000 +                                                                                    0   49
*630.000 +                                                                                    0   49
*640.000 +X                                                                                   1   50
*LAST    +                                                                                    0   50
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              5   10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
          run1

HISTOGRAM OF VARIABLE    3 tavh
                                    SYMBOL   COUNT      MEAN       ST.DEV.
                                      X        50      631.000      32.698
                              EACH SYMBOL REPRESENTS       1 OBSERVATIONS
INTERVAL                                                                              FREQUENCY
NAME          5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*560.000 +                                                                                  0    0
*570.000 +X                                                                                 1    1
*580.000 +XX                                                                                2    3
*590.000 +XXX                                                                               3    6
*600.000 +XXXXX                                                                             5   11
*610.000 +XXXXX                                                                             5   16
*620.000 +XX                                                                                2   18
*630.000 +XXXXXX                                                                            6   24
*640.000 +XXXXX                                                                             5   29
*650.000 +XXXXXXX                                                                           7   36
*660.000 +XXXXX                                                                             5   41
*670.000 +XXX                                                                               3   44
*680.000 +XXX                                                                               3   47
*690.000 +X                                                                                 1   48
*700.000 +X                                                                                 1   49
*710.000 +                                                                                  0   49
*720.000 +X                                                                                 1   50
*LAST    +                                                                                  0   50
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
run2

HISTOGRAM OF VARIABLE     1 tsv1
                              SYMBOL   COUNT      MEAN      ST.DEV.
                                X        51      400.020    116.400
                        EACH SYMBOL REPRESENTS        1 OBSERVATIONS
INTERVAL                                                                          FREQUENCY
NAME            5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*140.000 +X                                                                                   1    1
*160.000 +X                                                                                   1    2
*180.000 +                                                                                    0    2
*200.000 +X                                                                                   1    3
*220.000 +X                                                                                   1    4
*240.000 +X                                                                                   1    5
*260.000 +X                                                                                   1    6
*280.000 +X                                                                                   1    7
*300.000 +X                                                                                   1    8
*320.000 +X                                                                                   1    9
*340.000 +X                                                                                   1   10
*360.000 +XXX                                                                                 3   13
*380.000 +XX                                                                                  2   15
*400.000 +XXXXX                                                                               5   20
*420.000 +XXXXXXX                                                                             7   27
*440.000 +XX                                                                                  2   29
*460.000 +XX                                                                                  2   31
*480.000 +XXXX                                                                                4   35
*500.000 +XXXXX                                                                               5   40
*520.000 +XXX                                                                                 3   43
*540.000 +XXXX                                                                                4   47
*560.000 +XX                                                                                  2   49
*580.000 +XX                                                                                  2   51
*LAST    +                                                                                    0   51
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
              run2

HISTOGRAM OF VARIABLE     2 tsvn
                                      SYMBOL   COUNT      MEAN       ST.DEV.
                                        X        52      464.904     136.506
                              EACH SYMBOL REPRESENTS          1 OBSERVATIONS
INTERVAL                                                                                          FREQUENCY
NAME            5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80   INT. CUM.
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*200.000 +XX                                                                                     2     2
*220.000 +X                                                                                      1     3
*240.000 +                                                                                       0     3
*260.000 +X                                                                                      1     4
*280.000 +                                                                                       0     4
*300.000 +XX                                                                                     2     6
*320.000 +                                                                                       0     6
*340.000 +XX                                                                                     2     8
*360.000 +X                                                                                      1     9
*380.000 +X                                                                                      1    10
*400.000 +X                                                                                      1    11
*420.000 +X                                                                                      1    12
*440.000 +XXXX                                                                                   4    16
*460.000 +XX                                                                                     2    18
*480.000 +XXXXXXX                                                                                7    25
*500.000 +XX                                                                                     2    27
*520.000 +XXXXXX                                                                                 6    33
*540.000 +XXX                                                                                    3    36
*560.000 +XXX                                                                                    3    39
*580.000 +XXX                                                                                    3    42
*600.000 +XXXXX                                                                                  5    47
*620.000 +XXX                                                                                    3    50
*640.000 +XX                                                                                     2    52
*LAST    +                                                                                       0    52
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
                 run2

HISTOGRAM OF VARIABLE     3 tsvh
                                          SYMBOL   COUNT      MEAN      ST.DEV.
                                            X        52      518.789     141.184
                               EACH SYMBOL REPRESENTS          1 OBSERVATIONS
INTERVAL                                                                                      FREQUENCY
NAME            5    10    15    20    25    30    35    40    45    50    55    60    65    70    75    80   INT. CUM.
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*260.000  +XX                                                                                  2    2
*280.000  +X                                                                                   1    3
*300.000  +                                                                                    0    3
*320.000  +X                                                                                   1    4
*340.000  +X                                                                                   1    5
*360.000  +                                                                                    0    5
*380.000  +                                                                                    0    5
*400.000  +XXX                                                                                 3    8
*420.000  +X                                                                                   1    9
*440.000  +X                                                                                   1   10
*460.000  +X                                                                                   1   11
*480.000  +XX                                                                                  2   13
*500.000  +XXXX                                                                                4   17
*520.000  +XX                                                                                  2   19
*540.000  +XXXXX                                                                               5   24
*560.000  +XXXXX                                                                               5   29
*580.000  +XXXX                                                                                4   33
*600.000  +XX                                                                                  2   35
*620.000  +XXXXXX                                                                              6   41
*640.000  +XXXX                                                                                4   45
*660.000  +XXXXX                                                                               5   50
*680.000  +XX                                                                                  2   52
*LAST     +                                                                                    0   52
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                5    10    15    20    25    30    35    40    45    50    55    60    65    70    75    80
```

```
               run3

HISTOGRAM OF VARIABLE     1 tsv1
                                          SYMBOL  COUNT      MEAN      ST.DEV.
                                            X       50     283.440     137.530
                            EACH SYMBOL REPRESENTS         1 OBSERVATIONS
INTERVAL                                                                                      FREQUENCY
NAME           5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*0.00000 +                                                                                      0    0
*25.0000 +X                                                                                     1    1
*50.0000 +X                                                                                     1    2
*75.0000 +                                                                                      0    2
*100.000 +XX                                                                                    2    4
*125.000 +X                                                                                     1    5
*150.000 +X                                                                                     1    6
*175.000 +XXXXX                                                                                 5   11
*200.000 +XXXXX                                                                                 5   16
*225.000 +XX                                                                                    2   18
*250.000 +XXXXXXX                                                                               7   25
*275.000 +XXX                                                                                   3   28
*300.000 +XX                                                                                    2   30
*325.000 +XX                                                                                    2   32
*350.000 +XXX                                                                                   3   35
*375.000 +XX                                                                                    2   37
*400.000 +XXX                                                                                   3   40
*425.000 +XX                                                                                    2   42
*450.000 +X                                                                                     1   43
*475.000 +                                                                                      0   43
*500.000 +XX                                                                                    2   45
*525.000 +XX                                                                                    2   47
*550.000 +XX                                                                                    2   49
*575.000 +X                                                                                     1   50
*LAST    +                                                                                      0   50
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
               5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
                 run3

HISTOGRAM OF VARIABLE     2 tsvn
                                    SYMBOL   COUNT      MEAN      ST.DEV.
                                      X        50     345.540     138.599
                              EACH SYMBOL REPRESENTS        1 OBSERVATIONS
INTERVAL                                                                                  FREQUENCY
NAME            5    10    15    20    25    30    35    40    45    50    55    60    65    70    75    80  INT. CUM.
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*50.0000  +                                                                                 0    0
*75.0000  +X                                                                                1    1
*100.000  +X                                                                                1    2
*125.000  +                                                                                 0    2
*150.000  +XX                                                                               2    4
*175.000  +                                                                                 0    4
*200.000  +XX                                                                               2    6
*225.000  +XX                                                                               2    8
*250.000  +XXXX                                                                             4   12
*275.000  +XXXX                                                                             4   16
*300.000  +XXXXXX                                                                           6   22
*325.000  +XXXX                                                                             4   26
*350.000  +XXX                                                                              3   29
*375.000  +XX                                                                               2   31
*400.000  +XX                                                                               2   33
*425.000  +XXX                                                                              3   36
*450.000  +XXX                                                                              3   39
*475.000  +XXX                                                                              3   42
*500.000  +X                                                                                1   43
*525.000  +                                                                                 0   43
*550.000  +X                                                                                1   44
*575.000  +X                                                                                1   45
*600.000  +XX                                                                               2   47
*625.000  +XXX                                                                              3   50
*LAST     +                                                                                 0   50
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                5    10    15    20    25    30    35    40    45    50    55    60    65    70    75    80
```

```
                  run3

HISTOGRAM OF VARIABLE     3 tsvh
                                  SYMBOL   COUNT      MEAN      ST.DEV.
                                    X        50     406.660     133.084
                             EACH SYMBOL REPRESENTS        1 OBSERVATIONS
INTERVAL                                                                                        FREQUENCY
NAME           5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80   INT. CUM.
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*100.000  +                                                                                     0    0
*125.000  +X                                                                                    1    1
*150.000  +X                                                                                    1    2
*175.000  +                                                                                     0    2
*200.000  +                                                                                     0    2
*225.000  +XX                                                                                   2    4
*250.000  +X                                                                                    1    5
*275.000  +X                                                                                    1    6
*300.000  +XX                                                                                   2    8
*325.000  +XXXXX                                                                                5   13
*350.000  +XXXXXXX                                                                              7   20
*375.000  +XXXX                                                                                 4   24
*400.000  +XXXXX                                                                                5   29
*425.000  +                                                                                     0   29
*450.000  +XX                                                                                   2   31
*475.000  +XXX                                                                                  3   34
*500.000  +XXXX                                                                                 4   38
*525.000  +XXX                                                                                  3   41
*550.000  +X                                                                                    1   42
*575.000  +XX                                                                                   2   44
*600.000  +                                                                                     0   44
*625.000  +XX                                                                                   2   46
*650.000  +XX                                                                                   2   48
*675.000  +XX                                                                                   2   50
*LAST     +                                                                                     0   50
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
               5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
run4

HISTOGRAM OF VARIABLE     1 tsv1
                                   SYMBOL   COUNT      MEAN      ST.DEV.
                                     X        50      550.300      54.813
                          EACH SYMBOL REPRESENTS          1 OBSERVATIONS
INTERVAL                                                                                          FREQUENCY
NAME            5    10    15    20    25    30    35    40    45    50    55    60    65    70    75    80  INT. CUM.
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*420.000 +                                                                                          0    0
*430.000 +X                                                                                         1    1
*440.000 +X                                                                                         1    2
*450.000 +                                                                                          0    2
*460.000 +X                                                                                         1    3
*470.000 +X                                                                                         1    4
*480.000 +X                                                                                         1    5
*490.000 +XX                                                                                        2    7
*500.000 +XXX                                                                                       3   10
*510.000 +XXX                                                                                       3   13
*520.000 +XXX                                                                                       3   16
*530.000 +XX                                                                                        2   18
*540.000 +XXX                                                                                       3   21
*550.000 +XXX                                                                                       3   24
*560.000 +XX                                                                                        2   26
*570.000 +XX                                                                                        2   28
*580.000 +XXXX                                                                                      4   32
*590.000 +XXXXX                                                                                     5   37
*600.000 +XXXXXX                                                                                    6   43
*610.000 +X                                                                                         1   44
*620.000 +XXXX                                                                                      4   48
*630.000 +                                                                                          0   48
*640.000 +                                                                                          0   48
*650.000 +                                                                                          0   48
*660.000 +X                                                                                         1   49
*670.000 +                                                                                          0   49
*680.000 +X                                                                                         1   50
*LAST    +                                                                                          0   50
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                5    10    15    20    25    30    35    40    45    50    55    60    65    70    75    80
```

```
               run4

HISTOGRAM OF VARIABLE     1 tsv1
                                       SYMBOL   COUNT      MEAN      ST.DEV.
                                         X        50      550.300     54.613
                              EACH SYMBOL REPRESENTS         1 OBSERVATIONS
INTERVAL                                                                                FREQUENCY
NAME           5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*420.000  +                                                                                    0    0
*430.000  +X                                                                                   1    1
*440.000  +X                                                                                   1    2
*450.000  +                                                                                    0    2
*460.000  +X                                                                                   1    3
*470.000  +X                                                                                   1    4
*480.000  +X                                                                                   1    5
*490.000  +XX                                                                                  2    7
*500.000  +XXX                                                                                 3   10
*510.000  +XXX                                                                                 3   13
*520.000  +XXX                                                                                 3   16
*530.000  +XX                                                                                  2   18
*540.000  +XXX                                                                                 3   21
*550.000  +XXX                                                                                 3   24
*560.000  +XX                                                                                  2   26
*570.000  +XX                                                                                  2   28
*580.000  +XXXX                                                                                4   32
*590.000  +XXXXX                                                                               5   37
*600.000  +XXXXXX                                                                              6   43
*610.000  +X                                                                                   1   44
*620.000  +XXXX                                                                                4   48
*630.000  +                                                                                    0   48
*640.000  +                                                                                    0   48
*650.000  +                                                                                    0   48
*660.000  +X                                                                                   1   49
*670.000  +                                                                                    0   49
*680.000  +X                                                                                   1   50
*LAST     +                                                                                    0   50
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
               5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
        run4

HISTOGRAM OF VARIABLE    3 tsvh
                              SYMBOL   COUNT      MEAN      ST.DEV.
                                 X       50     659.940     34.775
                        EACH SYMBOL REPRESENTS         1 OBSERVATIONS
INTERVAL                                                                          FREQUENCY
NAME            5   10   15   20   25   30   35   40   45   50   55   60   65   70   75   80   INT. CUM.
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*590.000 +X                                                                          1    1
*600.000 +XX                                                                         2    3
*610.000 +X                                                                          1    4
*620.000 +XXXXX                                                                      5    9
*630.000 +XXX                                                                        3   12
*640.000 +XXX                                                                        3   15
*650.000 +XXXXXX                                                                     6   21
*660.000 +XXX                                                                        3   24
*670.000 +XX                                                                         2   26
*680.000 +XXXXXXXXXX                                                                10   36
*690.000 +XXXXX                                                                      5   41
*700.000 +XXXXX                                                                      5   46
*710.000 +XX                                                                         2   48
*720.000 +                                                                           0   48
*730.000 +X                                                                          1   49
*740.000 +                                                                           0   49
*750.000 +X                                                                          1   50
*LAST    +                                                                           0   50
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                5   10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
run5

HISTOGRAM OF VARIABLE    1 tsv1
                              SYMBOL  COUNT      MEAN      ST.DEV.
                                X       50      443.740    115.716
                        EACH SYMBOL REPRESENTS        1 OBSERVATIONS
INTERVAL                                                                                        FREQUENCY
NAME           5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80   INT. CUM.
            +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*125.000    +                                                                                   0    0
*150.000    +X                                                                                  1    1
*175.000    +                                                                                   0    1
*200.000    +X                                                                                  1    2
*225.000    +X                                                                                  1    3
*250.000    +X                                                                                  1    4
*275.000    +XX                                                                                 2    6
*300.000    +                                                                                   0    6
*325.0      +XX                                                                                 2    8
*350.000    +X                                                                                  1    9
*375.000    +XX                                                                                 2   11
*400.000    +XXXX                                                                               4   15
*425.000    +XXX                                                                                3   18
*450.000    +XXXXXXX                                                                            7   25
*475.000    +XXXX                                                                               4   29
*500.000    +XXX                                                                                3   32
*525.000    +XXXXX                                                                              5   37
*550.000    +XXX                                                                                3   40
*575.000    +XXX                                                                                3   43
*600.000    +XXXXXX                                                                             6   49
*625.000    +X                                                                                  1   50
*LAST       +                                                                                   0   50
            +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
               5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
                     run5

HISTOGRAM OF VARIABLE    2 tsvn
                                   SYMBOL   COUNT      MEAN      ST.DEV.
                                     X        50     503.360    115.089
                              EACH SYMBOL REPRESENTS       1 OBSERVATIONS
INTERVAL                                                                              FREQUENCY
NAME              5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80   INT. CUM.
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*175.000 +                                                                                0    0
*200.000 +X                                                                               1    1
*225.000 +                                                                                0    1
*250.000 +X                                                                               1    2
*275.000 +                                                                                0    2
*300.000 +XX                                                                              2    4
*325.000 +X                                                                               1    5
*350.000 +X                                                                               1    6
*375.000 +X                                                                               1    7
*400.000 +XX                                                                              2    9
*425.000 +                                                                                0    9
*450.000 +XXXXX                                                                           5   14
*475.000 +X                                                                               1   15
*500.000 +XXXXXXX                                                                         7   22
*525.000 +XXX                                                                             3   25
*550.000 +XXXXXXX                                                                         7   32
*575.000 +XX                                                                              2   34
*600.000 +XXXXX                                                                           5   39
*625.000 +XXX                                                                             3   42
*650.000 +XXXXXX                                                                          6   48
*675.000 +XX                                                                              2   50
*LAST    +                                                                                0   50
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                  5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
          run5

HISTOGRAM OF VARIABLE     3 tsvh
                              SYMBOL   COUNT      MEAN      ST.DEV.
                                X        50      553.260     111.718
                         EACH SYMBOL REPRESENTS        1 OBSERVATIONS
INTERVAL                                                                                     FREQUENCY
NAME          5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*225.000 +                                                                                    0    0
*250.000 +X                                                                                   1    1
*275.000 +                                                                                    0    1
*300.000 +X                                                                                   1    2
*325.000 +                                                                                    0    2
*350.000 +X                                                                                   1    3
*375.000 +X                                                                                   1    4
*400.000 +XX                                                                                  2    6
*425.000 +X                                                                                   1    7
*450.000 +XX                                                                                  2    9
*475.000 +X                                                                                   1   10
*500.000 +XXX                                                                                 3   13
*525.000 +XXXXX                                                                               5   18
*550.000 +XXXX                                                                                4   22
*575.000 +XXX                                                                                 3   25
*600.000 +XXXXX                                                                               5   30
*625.000 +XX                                                                                  2   32
*650.000 +XXXXXXXX                                                                            8   40
*675.000 +XXX                                                                                 3   43
*700.000 +XXXXXXX                                                                             7   50
*LAST    +                                                                                    0   50
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
        run6

HISTOGRAM OF VARIABLE     1 tsv1
                                   SYMBOL  COUNT      MEAN      ST.DEV.
                                     X       50     289.900     157.533
                          EACH SYMBOL REPRESENTS          1 OBSERVATIONS
INTERVAL                                                                                        FREQUENCY
NAME           5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80   INT.  CUM.
            +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*0.00000    +X                                                                                 1     1
*25.0000    +X                                                                                 1     2
*50.0000    +X                                                                                 1     3
*75.0000    +X                                                                                 1     4
*100.000    +                                                                                  0     4
*125.000    +X                                                                                 1     5
*150.000    +XXX                                                                               3     8
*175.000    +XXX                                                                               3    11
*200.000    +XXXXX                                                                             5    16
*225.000    +XXXX                                                                              4    20
*250.000    +XXXXX                                                                             5    25
*275.000    +XX                                                                                2    27
*300.000    +XXX                                                                               3    30
*325.000    +X                                                                                 1    31
*350.000    +XX                                                                                2    33
*375.000    +XX                                                                                2    35
*400.000    +XXX                                                                               3    38
*425.000    +XX                                                                                2    40
*450.000    +XX                                                                                2    42
*475.000    +X                                                                                 1    43
*500.000    +                                                                                  0    43
*525.000    +XX                                                                                2    45
*550.000    +X                                                                                 1    46
*575.000    +                                                                                  0    46
*600.000    +XXX                                                                               3    49
*625.000    +X                                                                                 1    50
*LAST       +                                                                                  0    50
            +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
               5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
run6

HISTOGRAM OF VARIABLE   2 tavn
                                   SYMBOL  COUNT     MEAN     ST.DEV.
                                     X       50     345.640    157.261
                          EACH SYMBOL REPRESENTS        1 OBSERVATIONS
INTERVAL                                                                                   FREQUENCY
NAME            5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*0.00000  +                                                                                  0    0
*25.0000  +X                                                                                 1    1
*50.0000  +X                                                                                 1    2
*75.0000  +                                                                                  0    2
*100.000  +                                                                                  0    2
*125.000  +XX                                                                                2    4
*150.000  +                                                                                  0    4
*175.000  +X                                                                                 1    5
*200.000  +XX                                                                                2    7
*225.000  +XXX                                                                               3   10
*250.000  +XXX                                                                               3   13
*275.000  +XXXXX                                                                             5   18
*300.000  +XXXXXX                                                                            6   24
*325.000  +XX                                                                                2   26
*350.000  +XXX                                                                               3   29
*375.000  +X                                                                                 1   30
*400.000  +XXX                                                                               3   33
*425.000  +X                                                                                 1   34
*450.000  +XXX                                                                               3   37
*475.000  +XXX                                                                               3   40
*500.000  +XX                                                                                2   42
*525.000  +X                                                                                 1   43
*550.000  +X                                                                                 1   44
*575.000  +                                                                                  0   44
*600.000  +X                                                                                 1   45
*625.000  +X                                                                                 1   46
*650.000  +XXX                                                                               3   49
*675.000  +X                                                                                 1   50
*LAST     +                                                                                  0   50
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
run6

HISTOGRAM OF VARIABLE    3 tsvh
                                   SYMBOL  COUNT     MEAN     ST.DEV.
                                     X       50     399.440    153.029
                            EACH SYMBOL REPRESENTS        1 OBSERVATIONS
INTERVAL                                                                             FREQUENCY
NAME            5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*50.0000 +                                                                             0    0
*75.0000 +X                                                                            1    1
*100.000 +X                                                                            1    2
*125.000 +                                                                             0    2
*150.000 +                                                                             0    2
*175.000 +XX                                                                           2    4
*200.000 +                                                                             0    4
*225.000 +X                                                                            1    5
*250.000 +XX                                                                           2    7
*275.000 +X                                                                            1    8
*300.000 +XXXXX                                                                        5   13
*325.000 +XXXX                                                                         4   17
*350.000 +XXXXX                                                                        5   22
*375.000 +XXXX                                                                         4   26
*400.000 +XXX                                                                          3   29
*425.000 +                                                                             0   29
*450.000 +XXX                                                                          3   32
*475.000 +X                                                                            1   33
*500.000 +XXX                                                                          3   36
*525.000 +XXXXX                                                                        5   41
*550.000 +                                                                             0   41
*575.000 +XX                                                                           2   43
*600.000 +X                                                                            1   44
*625.000 +                                                                             0   44
*650.000 +XX                                                                           2   46
*675.000 +                                                                             0   46
*700.000 +XXXX                                                                         4   50
*LAST    +                                                                             0   50
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
          run7

HISTOGRAM OF VARIABLE     1 tsv1
                                  SYMBOL   COUNT      MEAN      ST.DEV.
                                    X        50      581.020      57.113
                             EACH SYMBOL REPRESENTS         1 OBSERVATIONS
INTERVAL                                                                               FREQUENCY
NAME           5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*450.000 +                                                                                  0    0
*460.000 +X                                                                                 1    1
*470.000 +X                                                                                 1    2
*480.000 +                                                                                  0    2
*490.000 +XX                                                                                2    4
*500.000 +X                                                                                 1    5
*510.000 +                                                                                  0    5
*520.000 +XX                                                                                2    7
*530.000 +XXX                                                                               3   10
*540.000 +XXXX                                                                              4   14
*550.000 +                                                                                  0   14
*560.000 +XXXX                                                                              4   18
*570.000 +XX                                                                                2   20
*580.000 +XX                                                                                2   22
*590.000 +XXXXX                                                                             5   27
*600.000 +XX                                                                                2   29
*610.000 +                                                                                  0   29
*620.000 +XXXXXXX                                                                           7   36
*630.000 +XXXXX                                                                             5   41
*640.000 +XXXX                                                                              4   45
*650.000 +XX                                                                                2   47
*660.000 +X                                                                                 1   48
*670.000 +                                                                                  0   48
*680.000 +                                                                                  0   48
*690.000 +                                                                                  0   48
*700.000 +X                                                                                 1   49
*710.000 +X                                                                                 1   50
*LAST    +                                                                                  0   50
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
               5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
              run7

HISTOGRAM OF VARIABLE     2 tsvn
                                   SYMBOL   COUNT      MEAN      ST.DEV.
                                     X        50     637.640      45.024
                         EACH SYMBOL REPRESENTS         1 OBSERVATIONS
INTERVAL                                                                                    FREQUENCY
NAME           5    10    15    20    25    30    35    40    45    50    55    60    65    70    75    80   INT. CUM.
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*550.000 +X                                                                                   1    1
*560.000 +XX                                                                                  2    3
*570.000 +X                                                                                   1    4
*580.000 +XX                                                                                  2    6
*590.000 +XXX                                                                                 3    9
*600.000 +XXX                                                                                 3   12
*610.000 +XXXX                                                                                4   16
*620.000 +XXX                                                                                 3   19
*630.000 +XX                                                                                  2   21
*640.000 +XX                                                                                  2   23
*650.000 +XXXXX                                                                               5   28
*660.000 +XXXXXX                                                                              6   34
*670.000 +XXX                                                                                 3   37
*680.000 +XXXX                                                                                4   41
*690.000 +XXXX                                                                                4   45
*700.000 +XXX                                                                                 3   48
*710.000 +                                                                                    0   48
*720.000 +                                                                                    0   48
*730.000 +X                                                                                   1   49
*740.000 +X                                                                                   1   50
*LAST    +                                                                                    0   50
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
               5    10    15    20    25    30    35    40    45    50    55    60    65    70    75    80
```

```
                  run7

HISTOGRAM OF VARIABLE     3 tsvh
                                      SYMBOL   COUNT      MEAN     ST.DEV.
                                        X        50      682.660     37.840
                            EACH SYMBOL REPRESENTS        1 OBSERVATIONS
INTERVAL                                                                                          FREQUENCY
NAME            5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80   INT. CUM.
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*600.000 +                                                                                         0    0
*610.000 +X                                                                                        1    1
*620.000 +XX                                                                                       2    3
*630.000 +X                                                                                        1    4
*640.000 +XXXXX                                                                                    5    9
*650.000 +XX                                                                                       2   11
*660.000 +XXXX                                                                                     4   15
*670.000 +XXXXXX                                                                                   6   21
*680.000 +XX                                                                                       2   23
*690.000 +XXX                                                                                      3   26
*700.000 +XXXXXXXXX                                                                                9   35
*710.000 +XX                                                                                       2   37
*720.000 +XXXX                                                                                     4   41
*730.000 +XXXXXX                                                                                   6   47
*740.000 +X                                                                                        1   48
*750.000 +                                                                                         0   48
*760.000 +                                                                                         0   48
*770.000 +XX                                                                                       2   50
*LAST    +                                                                                         0   50
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
          run8

HISTOGRAM OF VARIABLE    1 tsvl
                                 SYMBOL   COUNT      MEAN      ST.DEV.
                                   X        50      463.920    126.183
                            EACH SYMBOL REPRESENTS       1 OBSERVATIONS
INTERVAL                                                                                 FREQUENCY
NAME           5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*125.000  +                                                                                  0    0
*150.000  +X                                                                                 1    1
*175.000  +X                                                                                 1    2
*200.000  +                                                                                  0    2
*225.000  +X                                                                                 1    3
*250.000  +X                                                                                 1    4
*275.000  +X                                                                                 1    5
*300.000  +X                                                                                 1    6
*325.000  +X                                                                                 1    7
*350.000  +X                                                                                 1    8
*375.000  +X                                                                                 1    9
*400.000  +XXXX                                                                              4   13
*425.000  +XX                                                                                2   15
*450.000  +XXXXX                                                                             5   20
*475.000  +XXX                                                                               3   23
*500.000  +XXXXXX                                                                            6   29
*525.000  +XXXX                                                                              4   33
*550.000  +XXX                                                                               3   36
*575.000  +XX                                                                                2   38
*600.000  +XXXXX                                                                             5   43
*625.000  +XXXXX                                                                             5   48
*650.000  +X                                                                                 1   49
*675.000  +X                                                                                 1   50
*LAST     +                                                                                  0   50
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
               5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
            run8

HISTOGRAM OF VARIABLE    2 tsvn
                              SYMBOL  COUNT     MEAN      ST.DEV.
                                X       50     518.700    125.701
                        EACH SYMBOL REPRESENTS        1 OBSERVATIONS
INTERVAL                                                                        FREQUENCY
NAME         5   10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*150.000  +                                                                                 0    0
*175.000  +X                                                                                1    1
*200.000  +                                                                                 0    1
*225.000  +X                                                                                1    2
*250.000  +                                                                                 0    2
*275.000  +                                                                                 0    2
*300.000  +XX                                                                               2    4
*325.000  +X                                                                                1    5
*350.000  +X                                                                                1    6
*375.000  +X                                                                                1    7
*400.000  +XX                                                                               2    9
*425.000  +                                                                                 0    9
*450.000  +XXX                                                                              3   12
*475.000  +XX                                                                               2   14
*500.000  +XXXXXX                                                                           6   20
*525.000  +XXX                                                                              3   23
*550.000  +XXX                                                                              3   26
*575.000  +XXXXXX                                                                           6   32
*600.000  +XX                                                                               2   34
*625.000  +XXXX                                                                             4   38
*650.000  +XXXX                                                                             4   42
*675.000  +XXXXXX                                                                           6   48
*700.000  +XX                                                                               2   50
*LAST     +                                                                                 0   50
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
             5   10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
        run8

HISTOGRAM OF VARIABLE    3 tsvh
                                   SYMBOL   COUNT      MEAN     ST.DEV.
                                     X        50      564.740    122.880
                          EACH SYMBOL REPRESENTS        1 OBSERVATIONS
INTERVAL                                                                                          FREQUENCY
NAME          5   10   15   20   25   30   35   40   45   50   55   60   65   70   75   80    INT. CUM.
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*200.000  +                                                                                    0    0
*225.000  +X                                                                                   1    1
*250.500  +                                                                                    0    1
*275.000  +                                                                                    0    1
*300.000  +X                                                                                   1    2
*325.000  +X                                                                                   1    3
*350.000  +X                                                                                   1    4
*375.000  +XX                                                                                  2    6
*400.000  +                                                                                    0    6
*425.000  +X                                                                                   1    7
*450.000  +XX                                                                                  2    9
*475.000  +                                                                                    0    9
*500.000  +XXX                                                                                 3   12
*525.000  +XXX                                                                                 3   15
*550.000  +XXXX                                                                                4   19
*575.000  +XXXXX                                                                               5   24
*600.000  +XXXX                                                                                4   28
*625.000  +XXX                                                                                 3   31
*650.000  +XX                                                                                  2   33
*675.000  +XXXXXXX                                                                             7   40
*700.000  +XXXXXX                                                                              6   46
*725.000  +XXX                                                                                 3   49
*750.000  +X                                                                                   1   50
*LAST     +                                                                                    0   50
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              5   10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
                run9

HISTOGRAM OF VARIABLE    1 tsv1
                                    SYMBOL  COUNT     MEAN     ST.DEV.
                                      X       50     294.300    171.702
                         EACH SYMBOL REPRESENTS         1 OBSERVATIONS
INTERVAL                                                                              FREQUENCY
NAME            5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*0.00000  +XX                                                                             2    2
*25.0000  +                                                                               0    2
*50.0000  +XX                                                                             2    4
*75.0000  +                                                                               0    4
*100.000  +                                                                               0    4
*125.000  +X                                                                              1    5
*150.000  +XXXX                                                                           4    9
*175.000  +X                                                                              1   10
*200.000  +XXXXXXX                                                                        7   17
*225.000  +XXXX                                                                           4   21
*250.000  +XXX                                                                            3   24
*275.000  +XXX                                                                            3   27
*300.000  +XX                                                                             2   29
*325.000  +X                                                                              1   30
*350.000  +XX                                                                             2   32
*375.000  +XX                                                                             2   34
*400.000  +XX                                                                             2   36
*425.000  +XXXX                                                                           4   40
*450.000  +X                                                                              1   41
*475.000  +X                                                                              1   42
*500.000  +X                                                                              1   43
*525.000  +X                                                                              1   44
*550.000  +X                                                                              1   45
*575.000  +                                                                               0   45
*600.000  +X                                                                              1   46
*625.000  +XXX                                                                            3   49
*650.000  +                                                                               0   49
*675.000  +X                                                                              1   50
*LAST     +                                                                               0   50
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
            run9

HISTOGRAM OF VARIABLE     2 tsvn
                              SYMBOL   COUNT      MEAN      ST.DEV.
                                 X       50      345.740    171.846
                      EACH SYMBOL REPRESENTS        1 OBSERVATIONS
INTERVAL                                                                              FREQUENCY
NAME          5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*0.00000 +X                                                                                 1    1
*25.0000 +X                                                                                 1    2
*50.0000 +                                                                                  0    2
*75.0000 +                                                                                  0    2
*100.000 +XX                                                                                2    4
*125.000 +                                                                                  0    4
*150.000 +                                                                                  0    4
*175.000 +XXX                                                                               3    7
*200.000 +X                                                                                 1    8
*225.000 +XX                                                                                2   10
*250.000 +XXXXXX                                                                            6   16
*275.000 +XXX                                                                               3   19
*300.000 +XXXXXX                                                                            6   25
*325.000 +XX                                                                                2   27
*350.000 +XX                                                                                2   29
*375.000 +X                                                                                 1   30
*400.000 +XXX                                                                               3   33
*425.000 +                                                                                  0   33
*450.000 +XX                                                                                2   35
*475.000 +XXXXX                                                                             5   40
*500.000 +X                                                                                 1   41
*525.000 +X                                                                                 1   42
*550.000 +X                                                                                 1   43
*575.000 +X                                                                                 1   44
*600.000 +                                                                                  0   44
*625.000 +X                                                                                 1   45
*650.000 +X                                                                                 1   46
*675.000 +XXX                                                                               3   49
*700.000 +X                                                                                 1   50
*LAST    +                                                                                  0   50
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
          run9

HISTOGRAM OF VARIABLE     3 tsvh
                                    SYMBOL   COUNT      MEAN      ST.DEV.
                                      X        50      395.100     168.036
                              EACH SYMBOL REPRESENTS        1 OBSERVATIONS
INTERVAL                                                                               FREQUENCY
NAME            5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*25.0000  +X                                                                                  1    1
*50.0000  +                                                                                   0    1
*75.0000  +X                                                                                  1    2
*100.000  +                                                                                   0    2
*125.000  +                                                                                   0    2
*150.000  +XX                                                                                 2    4
*175.000  +                                                                                   0    4
*200.000  +X                                                                                  1    5
*225.000  +XX                                                                                 2    7
*250.000  +                                                                                   0    7
*275.000  +XX                                                                                 2    9
*300.000  +XXXXXXX                                                                            7   16
*325.000  +XXX                                                                                3   19
*350.000  +XXXX                                                                               4   23
*375.000  +XXXXX                                                                              5   28
*400.000  +X                                                                                  1   29
*425.000  +                                                                                   0   29
*450.000  +XXXX                                                                               4   33
*475.000  +                                                                                   0   33
*500.000  +XX                                                                                 2   35
*525.000  +XXXXX                                                                              5   40
*550.000  +X                                                                                  1   41
*575.000  +XX                                                                                 2   43
*600.000  +X                                                                                  1   44
*625.000  +                                                                                   0   44
*650.000  +                                                                                   0   44
*675.000  +XX                                                                                 2   46
*700.000  +XX                                                                                 2   48
*725.000  +X                                                                                  1   49
*750.000  +X                                                                                  1   50
*LAST     +                                                                                   0   50
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
             run10

HISTOGRAM OF VARIABLE    1 tsv1
                                  SYMBOL   COUNT      MEAN     ST.DEV.
                                    X        50     540.420     46.616
                         EACH SYMBOL REPRESENTS          1 OBSERVATIONS
INTERVAL                                                                                    FREQUENCY
NAME            5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*400.000   +                                                                                 0    0
*415.000   +                                                                                 0    0
*430.000   +                                                                                 0    0
*445.000   +XX                                                                               2    2
*460.000   +XX                                                                               2    4
*475.000   +                                                                                 0    4
*490.000   +XXXXXX                                                                           6   10
*505.000   +XXX                                                                              3   13
*520.000   +XXXX                                                                             4   17
*535.000   +XXXXX                                                                            5   22
*550.000   +XXX                                                                              3   25
*565.000   +XXXXXXX                                                                          7   32
*580.000   +XXXXXXX                                                                          7   39
*595.000   +XXXXXXXX                                                                         8   47
*610.000   +X                                                                                1   48
*625.000   +                                                                                 0   48
*640.000   +X                                                                                1   49
*655.000   +X                                                                                1   50
*670.000   +                                                                                 0   50
*685.000   +                                                                                 0   50
*700.000   +                                                                                 0   50
*LAST      +                                                                                 0   50
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
          run10

HISTOGRAM OF VARIABLE    2 tsvn
                              SYMBOL  COUNT      MEAN      ST.DEV.
                                X       50      576.540     40.447
                        EACH SYMBOL REPRESENTS        1 OBSERVATIONS
INTERVAL                                                                                   FREQUENCY
NAME          5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*415.000  +                                                                                  0    0
*430.000  +                                                                                  0    0
*445.000  +                                                                                  0    0
*460.000  +                                                                                  0    0
*475.000  +                                                                                  0    0
*490.000  +                                                                                  0    0
*505.000  +XX                                                                                2    2
*520.000  +XXX                                                                               3    5
*535.000  +XXXX                                                                              4    9
*550.000  +XXXXX                                                                             5   14
*565.000  +XXXXXX                                                                            6   20
*580.000  +XXXXX                                                                             5   25
*595.000  +XXXXXXXX                                                                          8   33
*610.000  +XXXXXXX                                                                           7   40
*625.000  +XXXXXX                                                                            6   46
*640.000  +XX                                                                                2   48
*655.000  +X                                                                                 1   49
*670.000  +                                                                                  0   49
*685.000  +X                                                                                 1   50
*700.000  +                                                                                  0   50
*715.000  +                                                                                  0   50
*LAST     +                                                                                  0   50
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
                    run10

HISTOGRAM OF VARIABLE     3 tsvh
                                  SYMBOL   COUNT      MEAN      ST.DEV.
                                    X        50      606.280      35.541
                          EACH SYMBOL REPRESENTS          1 OBSERVATIONS
INTERVAL                                                                                        FREQUENCY
NAME              5    10    15    20    25    30    35    40    45    50    55    60    65    70    75    80   INT. CUM.
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*460.000 +                                                                                        0    0
*475.000 +                                                                                        0    0
*490.000 +                                                                                        0    0
*505.000 +                                                                                        0    0
*520.000 +                                                                                        0    0
*535.000 +                                                                                        0    0
*550.000 +XXX                                                                                     3    3
*565.000 +XXXX                                                                                    4    7
*580.000 +XXXXXXX                                                                                 7   14
*555.000 +XXXX                                                                                    4   18
*610.000 +XXXXXXXX                                                                                8   26
*625.000 +XXXXXXXX                                                                                8   34
*640.000 +XXXXXXXXX                                                                               9   43
*655.000 +XXXX                                                                                    4   47
*670.000 +X                                                                                       1   48
*685.000 +X                                                                                       1   49
*700.000 +X                                                                                       1   50
*715.000 +                                                                                        0   50
*730.000 +                                                                                        0   50
*745.000 +                                                                                        0   50
*760.000 +                                                                                        0   50
*LAST    +                                                                                        0   50
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                  5    10    15    20    25    30    35    40    45    50    55    60    65    70    75    80
```

```
                  run11

HISTOGRAM OF VARIABLE     1 tsv1
                                     SYMBOL   COUNT      MEAN      ST.DEV.
                                       X        50     447.880     101.603
                             EACH SYMBOL REPRESENTS         1 OBSERVATIONS
INTERVAL                                                                                   FREQUENCY
NAME           5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*150.000  +                                                                                   0    0
*175.000  +                                                                                   0    0
*200.000  +X                                                                                  1    1
*225.000  +X                                                                                  1    2
*250.000  +XX                                                                                 2    4
*275.000  +                                                                                   0    4
*300.000  +XX                                                                                 2    6
*325.000  +                                                                                   0    6
*350.000  +XX                                                                                 2    8
*375.000  +XX                                                                                 2   10
*400.000  +XXX                                                                                3   13
*425.000  +XX                                                                                 2   15
*450.000  +XXXXXXX                                                                            7   22
*475.000  +XXXXXXX                                                                            7   29
*500.000  +XXXX                                                                               4   33
*525.000  +XXXXX                                                                              5   38
*550.000  +XXX                                                                                3   41
*575.000  +XXXXX                                                                              5   46
*600.000  +XXXX                                                                               4   50
*625.000  +                                                                                   0   50
*650.000  +                                                                                   0   50
*LAST     +                                                                                   0   50
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
               5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
                    run11

HISTOGRAM OF VARIABLE    2 ...
                                       SYMBOL   COUNT       MEAN       ST.DEV.
                                          X       50      483.500      101.093
                              EACH SYMBOL REPRESENTS         1 OBSERVATIONS
INTERVAL                                                                                              FREQUENCY
NAME             5    10    15    20    25    30    35    40    45    50    55    60    65    70    75    80   INT. CUM.
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*150.000 +                                                                                          0    0
*175.000 +                                                                                          0    0
*200.000 +                                                                                          0    0
*225.000 +X                                                                                         1    1
*250.000 +X                                                                                         1    2
*275.000 +                                                                                          0    2
*300.000 +XX                                                                                        2    4
*325.000 +X                                                                                         1    5
*350.000 +X                                                                                         1    6
*375.000 +XX                                                                                        2    8
*400.000 +X                                                                                         1    9
*425.000 +XXXX                                                                                      4   13
*450.000 +XX                                                                                        2   15
*475.000 +XXXXXX                                                                                    6   21
*500.000 +XXXX                                                                                      4   25
*525.000 +XXXXXX                                                                                    6   31
*550.000 +XXXX                                                                                      4   35
*575.000 +XXXX                                                                                      4   39
*600.000 +XXXXXX                                                                                    6   45
*625.000 +XXXXX                                                                                     5   50
*650.000 +                                                                                          0   50
*LAST    +                                                                                          0   50
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                 5    10    15    20    25    30    35    40    45    50    55    60    65    70    75    80
```

```
        run11

HISTOGRAM OF VARIABLE    3 tsvh
                                 SYMBOL  COUNT      MEAN     ST.DEV.
                                   X       50     513.740     99.067
                          EACH SYMBOL REPRESENTS      1 OBSERVATIONS
INTERVAL                                                                               FREQUENCY
NAME          5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80   INT. CUM.
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*200.000 +                                                                                 0    0
*225.000 +                                                                                 0    0
*250.000 +X                                                                                1    1
*275.000 +                                                                                 0    1
*300.000 +X                                                                                1    2
*325.000 +X                                                                                1    3
*350.000 +X                                                                                1    4
*375.000 +XX                                                                               2    6
*400.000 +X                                                                                1    7
*425.000 +XX                                                                               2    9
*450.000 +X                                                                                1   10
*475.000 +XXXX                                                                             4   14
*500.000 +XXXXX                                                                            5   19
*525.000 +XXXXXX                                                                           6   25
*550.000 +XXXXX                                                                            5   30
*575.000 +XXX                                                                              3   33
*600.000 +XXXXXX                                                                           6   39
*625.000 +XXXXXX                                                                           6   45
*650.000 +XXX                                                                              3   48
*675.000 +XX                                                                               2   50
*700.000 +                                                                                 0   50
*LAST    +                                                                                 0   50
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
        run12

HISTOGRAM OF VARIABLE    1 tsvl
                                     SYMBOL  COUNT     MEAN     ST.DEV.
                                       X       5Ø     312.ØØØ    138.479
                               EACH SYMBOL REPRESENTS     1 OBSERVATIONS
INTERVAL                                                                                   FREQUENCY
NAME            5    1Ø   15   2Ø   25   3Ø   35   4Ø   45   5Ø   55   6Ø   65   7Ø   75   8Ø  INT. CUM.
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*Ø.ØØØØØ  +                                                                                   Ø    Ø
*3Ø.ØØØØ  +                                                                                   Ø    Ø
*6Ø.ØØØØ  +XX                                                                                 2    2
*9Ø.ØØØØ  +                                                                                   Ø    2
*12Ø.ØØØ  +XX                                                                                 2    4
*15Ø.ØØØ  +X                                                                                  1    5
*18Ø.ØØØ  +XX                                                                                 2    7
*21Ø.ØØØ  +XXXX                                                                               4   11
*24Ø.ØØØ  +XXXXXX                                                                             6   17
*27Ø.ØØØ  +XXXXXXX                                                                            7   24
*3ØØ.ØØØ  +XXX                                                                                3   27
*33Ø.ØØØ  +XXX                                                                                3   3Ø
*36Ø.ØØØ  +XX                                                                                 2   32
*39Ø.ØØØ  +XXX                                                                                3   35
*42Ø.ØØØ  +XXXXX                                                                              5   4Ø
*45Ø.ØØØ  +XX                                                                                 2   42
*48Ø.ØØØ  +X                                                                                  1   43
*51Ø.ØØØ  +                                                                                   Ø   43
*54Ø.ØØØ  +XX                                                                                 2   45
*57Ø.ØØØ  +XX                                                                                 2   47
*6ØØ.ØØØ  +XXX                                                                                3   5Ø
*LAST     +                                                                                   Ø   5Ø
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                5    1Ø   15   2Ø   25   3Ø   35   4Ø   45   5Ø   55   6Ø   65   7Ø   75   8Ø
```

```
              run12

HISTOGRAM OF VARIABLE    2 tsvn
                                 SYMBOL  COUNT      MEAN     ST.DEV.
                                   X       50      345.540    138.599
                           EACH SYMBOL REPRESENTS       1 OBSERVATIONS
INTERVAL                                                                             FREQUENCY
NAME            5   10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*30.0000   +                                                                                  0    0
*60.0000   +X                                                                                 1    1
*90.0000   +X                                                                                 1    2
*120.000   +                                                                                  0    2
*150.000   +XX                                                                                2    4
*180.000   +X                                                                                 1    5
*210.000   +X                                                                                 1    6
*240.000   +XXX                                                                               3    9
*270.000   +XXXXXXX                                                                           7   16
*300.000   +XXXXXX                                                                            6   22
*330.000   +XXXXX                                                                             5   27
*360.000   +XX                                                                                2   29
*390.000   +XXX                                                                               3   32
*420.000   +XX                                                                                2   34
*450.000   +XXXXX                                                                             5   39
*480.000   +XXX                                                                               3   42
*510.000   +X                                                                                 1   43
*540.000   +X                                                                                 1   44
*570.000   +X                                                                                 1   45
*600.000   +XX                                                                                2   47
*630.000   +XXX                                                                               3   50
*LAST      +                                                                                  0   50
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                5   10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
          run12

HISTOGRAM OF VARIABLE    3 tsvh
                                   SYMBOL  COUNT      MEAN      ST.DEV.
                                     X       50     377.800     135.891
                         EACH SYMBOL REPRESENTS       1 OBSERVATIONS
INTERVAL                                                                                    FREQUENCY
NAME             5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80   INT. CUM.
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*60.0000   +                                                                                   0    0
*90.0000   +X                                                                                  1    1
*120.000   +X                                                                                  1    2
*150.000   +                                                                                   0    2
*180.000   +                                                                                   0    2
*210.000   +XXX                                                                                3    5
*240.000   +X                                                                                  1    6
*270.000   +XXX                                                                                3    9
*300.000   +XXXXXXX                                                                            7   16
*330.000   +XXXXX                                                                              5   21
*360.000   +XXXXXX                                                                             6   27
*390.000   +XX                                                                                 2   29
*420.000   +XX                                                                                 2   31
*450.000   +XXX                                                                                3   34
*480.000   +XXXXXX                                                                             6   40
*510.000   +X                                                                                  1   41
*540.000   +XX                                                                                 2   43
*570.000   +X                                                                                  1   44
*600.000   +X                                                                                  1   45
*630.000   +XXX                                                                                3   48
*660.000   +XX                                                                                 2   50
*LAST      +                                                                                   0   50
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                 5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
          run13

HISTOGRAM OF VARIABLE     1 tsv1
                                   SYMBOL  COUNT      MEAN      ST.DEV.
                                     X       50      579.640     49.292
                         EACH SYMBOL REPRESENTS         1 OBSERVATIONS
INTERVAL                                                                                FREQUENCY
NAME           5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*430.000 +                                                                                 0    0
*445.000 +                                                                                 0    0
*460.000 +                                                                                 0    0
*475.000 +X                                                                                1    1
*490.000 +X                                                                                1    2
*505.000 +XX                                                                               2    4
*520.000 +XXX                                                                              3    7
*535.000 +XXXXX                                                                            5   12
*550.000 +XX                                                                               2   14
*565.000 +XXXXX                                                                            5   19
*580.000 +XXXX                                                                             4   23
*595.000 +XXXXX                                                                            5   28
*610.000 +XXXXXX                                                                           6   34
*625.000 +XXXXXXX                                                                          7   41
*640.000 +XXXXXX                                                                           6   47
*655.000 +X                                                                                1   48
*670.000 +                                                                                 0   48
*685.000 +X                                                                                1   49
*700.000 +X                                                                                1   50
*715.000 +                                                                                 0   50
*730.000 +                                                                                 0   50
*LAST    +                                                                                 0   50
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
               5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
run13

HISTOGRAM OF VARIABLE    2 tsvn
                                  SYMBOL  COUNT     MEAN      ST.DEV.
                                    X       50     611.360     42.285
                            EACH SYMBOL REPRESENTS     1 OBSERVATIONS
INTERVAL                                                                          FREQUENCY
NAME          5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
            +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*490.000 +                                                                                    0    0
*505.000 +                                                                                    0    0
*520.000 +                                                                                    0    0
*535.000 +XX                                                                                  2    2
*550.000 +XXX                                                                                 3    5
*565.000 +XXX                                                                                 3    8
*580.000 +XXXXX                                                                               5   13
*595.000 +XXXXXX                                                                              6   19
*610.000 +XXXX                                                                                4   23
*625.000 +XXXXX                                                                               5   28
*640.000 +XXXXXXXXX                                                                           9   37
*655.000 +XXXXXXX                                                                             7   44
*670.000 +XXXX                                                                                4   48
*685.000 +                                                                                    0   48
*700.000 +X                                                                                   1   49
*715.000 +X                                                                                   1   50
*730.000 +                                                                                    0   50
*745.000 +                                                                                    0   50
*760.000 +                                                                                    0   50
*775.000 +                                                                                    0   50
*790.000 +                                                                                    0   50
*LAST    +                                                                                    0   50
            +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
run13

HISTOGRAM OF VARIABLE    3 tsvh
                                    SYMBOL  COUNT      MEAN      ST.DEV.
                                      X       50     637.420      37.721
                              EACH SYMBOL REPRESENTS        1 OBSERVATIONS
INTERVAL                                                                                    FREQUENCY
NAME             5    10    15    20    25    30    35    40    45    50    55    60    65    70    75    80   INT. CUM.
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*490.000 +                                                                                    0    0
*505.000 +                                                                                    0    0
*520.000 +                                                                                    0    0
*535.000 +                                                                                    0    0
*550.000 +                                                                                    0    0
*565.000 +X                                                                                   1    1
*580.000 +XX                                                                                  2    3
*595.000 +XXXXXX                                                                              6    9
*610.000 +XXXX                                                                                4   13
*625.000 +XXXXXXXX                                                                            8   21
*640.000 +XXX                                                                                 3   24
*655.000 +XXXXXXXX                                                                            8   32
*670.000 +XXXXXXXXX                                                                           9   41
*685.000 +XXXXXX                                                                              6   47
*700.000 +X                                                                                   1   48
*715.000 +X                                                                                   1   49
*730.000 +X                                                                                   1   50
*745.000 +                                                                                    0   50
*760.000 +                                                                                    0   50
*775.000 +                                                                                    0   50
*790.000 +                                                                                    0   50
*LAST    +                                                                                    0   50
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                 5    10    15    20    25    30    35    40    45    50    55    60    65    70    75    80
```

```
ru-14

HISTOGRAM OF VARIABLE    1 tsv1
                              SYMBOL  COUNT     MEAN      ST.DEV.
                                X      50     472.480     115.033
                        EACH SYMBOL REPRESENTS       1 OBSERVATIONS
INTERVAL                                                                                FREQUENCY
NAME             5   10   15   20   25   30   35   40   45   50   55   60   65   70   75   80   INT. CUM.
            +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*150.000 +                                                                                 0    0
*175.000 +X                                                                                1    1
*200.000 +                                                                                 0    1
*225.000 +X                                                                                1    2
*250.000 +XX                                                                               2    4
*275.000 +                                                                                 0    4
*300.000 +X                                                                                1    5
*325.000 +X                                                                                1    6
*350.000 +XX                                                                               2    8
*375.000 +X                                                                                1    9
*400.000 +XX                                                                               2   11
*425.000 +XXX                                                                              3   14
*450.000 +XXX                                                                              3   17
*475.000 +XXXXXX                                                                           6   23
*500.000 +XXXXX                                                                            5   28
*525.000 +XXXX                                                                             4   32
*550.000 +XXXX                                                                             4   36
*575.000 +XXXXX                                                                            5   41
*600.000 +XX                                                                               2   43
*625.000 +XXXXXX                                                                           6   49
*650.000 +X                                                                                1   50
*LAST    +                                                                                 0   50
            +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                 5   10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
              run14

HISTOGRAM OF VARIAPLE    2 tsvn
                               SYMBOL   COUNT      MEAN      ST.DEV.
                                 X        50     503.360     115.089
                         EACH SYMBOL REPRESENTS        1 OBSERVATIONS
INTERVAL                                                                                FREQUENCY
NAME          5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*175.000  +                                                                                  0    0
*200.000  +X                                                                                 1    1
*225.000  +                                                                                  0    1
*250.000  +X                                                                                 1    2
*275.000  +                                                                                  0    2
*300.000  +XX                                                                                2    4
*325.000  +X                                                                                 1    5
*350.000  +X                                                                                 1    6
*375.000  +X                                                                                 1    7
*400.000  +XX                                                                                2    9
*425.000  +                                                                                  0    9
*450.000  +XXXXX                                                                             5   14
*475.000  +X                                                                                 1   15
*500.000  +XXXXXXX                                                                           7   22
*525.000  +XXX                                                                               3   25
*550.000  +XXXXXXX                                                                           7   32
*575.000  +XX                                                                                2   34
*600.000  +XXXXX                                                                             5   39
*625.000  +XXX                                                                               3   42
*650.000  +XXXXXX                                                                            6   48
*675.000  +XX                                                                                2   50
*LAST     +                                                                                  0   50
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
               5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
               runl4

HISTOGRAM OF VARIABLE    3 tsvh
                                SYMBOL  COUNT      MEAN     ST.DEV.
                                  X       5Ø      53Ø.28Ø    113.223
                         EACH SYMBOL REPRESENTS        1 OBSERVATIONS
INTERVAL                                                                                  FREQUENCY
NAME            5    1Ø   15   2Ø   25   3Ø   35   4Ø   45   5Ø   55   6Ø   65   7Ø   75   8Ø  INT. CUM.
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*2ØØ.ØØØ +                                                                                   Ø    Ø
*225.ØØØ +X                                                                                  1    1
*25Ø.ØØØ +                                                                                   Ø    1
*275.ØØØ +                                                                                   Ø    1
*3ØØ.ØØØ +X                                                                                  1    2
*325.ØØØ +XX                                                                                 2    4
*35Ø.ØØØ +                                                                                   Ø    4
*375.ØØØ +XX                                                                                 2    6
*4ØØ.ØØØ +X                                                                                  1    7
*425.ØØØ +XX                                                                                 2    9
*45Ø.ØØØ +                                                                                   Ø    9
*475.ØØØ +XXXX                                                                               4   13
*5ØØ.ØØØ +XXX                                                                                3   16
*525.ØØØ +XXXXXX                                                                             6   22
*55Ø.ØØØ +XXX                                                                                3   25
*575.ØØØ +XXXXXX                                                                             6   31
*6ØØ.ØØØ +X                                                                                  1   32
*625.ØØØ +XXXXXXX                                                                            7   39
*65Ø.ØØØ +XXX                                                                                3   42
*675.ØØØ +XXXXXX                                                                             6   48
*7ØØ.ØØØ +XX                                                                                 2   5Ø
*LAST    +                                                                                   Ø   5Ø
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                5    1Ø   15   2Ø   25   3Ø   35   4Ø   45   5Ø   55   6Ø   65   7Ø   75   8Ø
```

```
              run15

HISTOGRAM OF VARIABLE     1 tsv1
                                    SYMBOL  COUNT      MEAN     ST.DEV.
                                      X       50     316.180    157.155
                              EACH SYMBOL REPRESENTS           1 OBSERVATIONS
INTERVAL                                                                                      FREQUENCY
NAME          5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80   INT. CUM.
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*0.00000  +X                                                                                  1    1
*35.0000  +X                                                                                  1    2
*70.0000  +                                                                                   0    2
*105.000  +XX                                                                                 2    4
*140.000  +X                                                                                  1    5
*175.000  +XXX                                                                                3    8
*210.000  +XX                                                                                 2   10
*245.000  +XXXXXXXXXXX                                                                       11   21
*280.000  +XXXX                                                                               4   25
*315.000  +XXX                                                                                3   28
*350.000  +XX                                                                                 2   30
*385.000  +XXX                                                                                3   33
*420.000  +XXXXX                                                                              5   38
*455.000  +XXX                                                                                3   41
*490.000  +X                                                                                  1   42
*525.000  +XX                                                                                 2   44
*560.000  +X                                                                                  1   45
*595.000  +X                                                                                  1   46
*630.000  +XXX                                                                                3   49
*665.000  +X                                                                                  1   50
*700.000  +                                                                                   0   50
*LAST     +                                                                                   0   50
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
            run15

HISTOGRAM OF VARIABLE     2 tsvn
                                  SYMBOL   COUNT      MEAN     ST.DEV.
                                     X        50     345.640    157.261
                            EACH SYMBOL REPRESENTS          1 OBSERVATIONS
INTERVAL                                                                                FREQUENCY
NAME          5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
        +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*0.00000 +                                                                                   0    0
*35.0000 +X                                                                                  1    1
*70.0000 +X                                                                                  1    2
*105.000 +X                                                                                  1    3
*140.000 +X                                                                                  1    4
*175.000 +X                                                                                  1    5
*210.000 +XXX                                                                                3    8
*245.000 +XXXXX                                                                              5   13
*280.000 +XXXXXX                                                                             6   19
*315.000 +XXXXXXX                                                                            7   26
*350.000 +XXX                                                                                3   29
*385.000 +XX                                                                                 2   31
*420.000 +XX                                                                                 2   33
*455.000 +XXXX                                                                               4   37
*490.000 +XXXX                                                                               4   41
*525.000 +XX                                                                                 2   43
*560.000 +X                                                                                  1   44
*595.000 +X                                                                                  1   45
*630.000 +X                                                                                  1   46
*665.000 +XXXX                                                                               4   50
*700.000 +                                                                                   0   50
*LAST    +                                                                                   0   50
        +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
             run15

HISTOGRAM OF VARIABLE    3 tsvh
                                  SYMBOL  COUNT      MEAN      ST.DEV.
                                    X       50     373.900     154.975
                            EACH SYMBOL REPRESENTS        1 OBSERVATIONS
INTERVAL                                                                                         FREQUENCY
NAME            5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80   INT.  CUM.
              +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*0.00000    +                                                                                    0     0
*35.0000    +                                                                                    0     0
*70.0000    +XX                                                                                  2     2
*105.000    +                                                                                    0     2
*140.000    +                                                                                    0     2
*175.000    +XX                                                                                  2     4
*210.000    +XX                                                                                  2     6
*245.000    +XXX                                                                                 3     9
*280.000    +XXXXX                                                                               5    14
*315.000    +XXXXXXX                                                                             7    21
*350.000    +XXXXX                                                                               5    26
*385.000    +XXX                                                                                 3    29
*420.000    +XXX                                                                                 3    32
*455.000    +XX                                                                                  2    34
*490.000    +XXXXXX                                                                              6    40
*525.000    +X                                                                                   1    41
*560.000    +XXX                                                                                 3    44
*595.000    +                                                                                    0    44
*630.000    +X                                                                                   1    45
*665.000    +XXXX                                                                                4    49
*700.000    +X                                                                                   1    50
*LAST       +                                                                                    0    50
              +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
           run16

HISTOGRAM OF VARIABLE    1 tsvl
                                   SYMBOL   COUNT      MEAN     ST.DEV.
                                     X        50     609.260      51.383
                          EACH SYMBOL REPRESENTS         1 OBSERVATIONS
INTERVAL                                                                                FREQUENCY
NAME          5    10    15    20    25    30    35    40    45    50    55    60    65    70    75    80  INT. CUM.
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*450.000 +                                                                                  0    0
*475.000 +                                                                                  0    0
*490.000 +                                                                                  0    0
*505.000 +X                                                                                 1    1
*520.000 +XX                                                                                2    3
*535.000 +XX                                                                                2    5
*550.000 +XXX                                                                               3    8
*565.000 +XXXX                                                                              4   12
*580.000 +XXXXX                                                                             5   17
*595.000 +XXX                                                                               3   20
*610.000 +XXX                                                                               3   23
*625.000 +XXXXXX                                                                            6   29
*640.000 +XXXXXXXX                                                                          8   37
*655.000 +XXX                                                                               3   40
*670.000 +XXXXXXX                                                                           7   47
*685.000 +X                                                                                 1   48
*700.000 +                                                                                  0   48
*715.000 +X                                                                                 1   49
*730.000 +X                                                                                 1   50
*745.000 +                                                                                  0   50
*760.000 +                                                                                  0   50
*LAST    +                                                                                  0   50
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              5    10    15    20    25    30    35    40    45    50    55    60    65    70    75    80
```

```
            run16

HISTOGRAM OF VARIABLE     2 tsvn
                                   SYMBOL   COUNT      MEAN      ST.DEV.
                                     X        50      637.640     45.024
                            EACH SYMBOL REPRESENTS         1 OBSERVATIONS
INTERVAL                                                                                    FREQUENCY
NAME            5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*490.000 +                                                                                     0    0
*505.000 +                                                                                     0    0
*520.000 +                                                                                     0    0
*535.000 +                                                                                     0    0
*550.000 +X                                                                                    1    1
*565.000 +XX                                                                                   2    3
*580.000 +XXX                                                                                  3    6
*595.000 +XXXX                                                                                 4   10
*610.000 +XXXXXX                                                                               6   16
*625.000 +XXXX                                                                                 4   20
*640.000 +XXX                                                                                  3   23
*655.000 +XXXXX                                                                                5   28
*670.000 +XXXXXXXXX                                                                            9   37
*685.000 +XXXXXX                                                                               6   43
*700.000 +XXXXX                                                                                5   48
*715.000 +                                                                                     0   48
*730.000 +X                                                                                    1   49
*745.000 +X                                                                                    1   50
*760.000 +                                                                                     0   50
*775.000 +                                                                                     0   50
*790.000 +                                                                                     0   50
*LAST     +                                                                                    0   50
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
        run16

HISTOGRAM OF VARIABLE    3 tsvh
                                 SYMBOL  COUNT      MEAN      ST.DEV.
                                   X       50     661.720     40.699
                        EACH SYMBOL REPRESENTS        1 OBSERVATIONS
INTERVAL                                                                                    FREQUENCY
NAME          5   10   15   20   25   30   35   40   45   50   55   60   65   70   75   80   INT. CUM.
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*520.000 +                                                                                   0    0
*535.000 +                                                                                   0    0
*550.000 +                                                                                   0    0
*565.000 +                                                                                   0    0
*580.000 +X                                                                                  1    1
*595.000 +XX                                                                                 2    3
*610.000 +XXX                                                                                3    6
*625.000 +XXXXX                                                                              5   11
*640.000 +XXXXXXX                                                                            7   18
*655.000 +XXX                                                                                3   21
*670.000 +XXXXX                                                                              5   26
*685.000 +XXXXXXXXXX                                                                        10   36
*700.000 +XXXX                                                                               4   40
*715.000 +XXXXXXXX                                                                           8   48
*730.000 +                                                                                   0   48
*745.000 +X                                                                                  1   49
*760.000 +X                                                                                  1   50
*775.000 +                                                                                   0   50
*790.000 +                                                                                   0   50
*805.000 +                                                                                   0   50
*820.000 +                                                                                   0   50
*LAST    +                                                                                   0   50
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              5   10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
          run17

HISTOGRAM OF VARIABLE     1 tsv1
                                  SYMBOL   COUNT      MEAN      ST.DEV.
                                    X        50      490.920     125.330
                          EACH SYMBOL REPRESENTS          1 OBSERVATIONS
INTERVAL                                                                              FREQUENCY
NAME             5    10    15    20    25    30    35    40    45    50    55    60    65    70    75    80  INT. CUM.
               +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*120.000 +                                                                                        0    0
*150.000 +X                                                                                       1    1
*180.000 +                                                                                        0    1
*210.000 +X                                                                                       1    2
*240.000 +                                                                                        0    2
*270.000 +XX                                                                                      2    4
*300.000 +X                                                                                       1    5
*330.000 +X                                                                                       1    6
*360.000 +XX                                                                                      2    8
*390.000 +X                                                                                       1    9
*420.000 +XXX                                                                                     3   12
*450.000 +XX                                                                                      2   14
*480.000 +XXXXXXX                                                                                 7   21
*510.000 +XXX                                                                                     3   24
*540.000 +XXXXXXXX                                                                                8   32
*570.000 +XX                                                                                      2   34
*600.000 +XXXXX                                                                                   5   39
*630.000 +XXXX                                                                                    4   43
*660.000 +XXXXXX                                                                                  6   49
*690.000 +X                                                                                       1   50
*720.000 +                                                                                        0   50
*LAST    +                                                                                        0   50
               +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                 5    10    15    20    25    30    35    40    45    50    55    60    65    70    75    80
```

```
          run17

HISTOGRAM OF VARIABLE     2 tsvn
                               SYMBOL   COUNT      MEAN     ST.DEV.
                                 X        50      518.700    125.701
                          EACH SYMBOL REPRESENTS         1 OBSERVATIONS
INTERVAL                                                                                FREQUENCY
NAME            5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*120.000 +                                                                                  0    0
*150.000 +                                                                                  0    0
*180.000 +X                                                                                 1    1
*210.000 +                                                                                  0    1
*240.000 +X                                                                                 1    2
*270.000 +                                                                                  0    2
*300.000 +XX                                                                                2    4
*330.000 +XX                                                                                2    6
*360.000 +                                                                                  0    6
*390.000 +XX                                                                                2    8
*420.000 +X                                                                                 1    9
*450.000 +XXX                                                                               3   12
*480.000 +XXX                                                                               3   15
*510.000 +XXXXXX                                                                            6   21
*540.000 +XXXX                                                                              4   25
*570.000 +XXXXXX                                                                            6   31
*600.000 +XXX                                                                               3   34
*630.000 +XXXXXX                                                                            6   40
*660.000 +XXXXX                                                                             5   45
*690.000 +XXXX                                                                              4   [illegible]
*720.000 +X                                                                                 1   [illegible]
*LAST    +                                                                                  0   [illegible]
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
             run17

HISTOGRAM OF VARIABLE    3 tsvh
                                  SYMBOL  COUNT      MEAN     ST.DEV.
                                    X       50     543.340    124.687
                        EACH SYMBOL REPRESENTS        1 OBSERVATIONS
INTERVAL                                                                           FREQUENCY
NAME            5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*150.000 +                                                                                     0    0
*180.000 +                                                                                     0    0
*210.000 +X                                                                                    1    1
*240.000 +                                                                                     0    1
*270.000 +X                                                                                    1    2
*300.000 +                                                                                     0    2
*330.000 +XX                                                                                   2    4
*360.000 +XX                                                                                   2    6
*390.000 +X                                                                                    1    7
*420.000 +X                                                                                    1    8
*450.000 +X                                                                                    1    9
*480.000 +XXXX                                                                                 4   13
*510.000 +XXX                                                                                  3   16
*540.000 +XXXXXXX                                                                              7   23
*570.000 +XXX                                                                                  3   26
*600.000 +XXXXX                                                                                5   31
*630.000 +XXXX                                                                                 4   35
*660.000 +XXXXX                                                                                5   40
*690.000 +XXXXXXX                                                                              7   47
*720.000 +XXX                                                                                  3   50
*750.000 +                                                                                     0   50
*LAST    +                                                                                     0   50
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
            run18

HISTOGRAM OF VARIABLE     1 tsv1
                                   SYMBOL  COUNT      MEAN      ST.DEV.
                                     X       50     319.060     171.812
                         EACH SYMBOL REPRESENTS          1 OBSERVATIONS
INTERVAL                                                                                   FREQUENCY
NAME            5    10    15    20    25    30    35    40    45    50    55    60    65    70    75    80  INT. CUM.
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*0.00000   +XX                                                                               2    2
*35.0000   +                                                                                 0    2
*70.0000   +XX                                                                               2    4
*105.000   +                                                                                 0    4
*140.000   +X                                                                                1    5
*175.000   +XXX                                                                              3    8
*210.000   +XXX                                                                              3   11
*245.000   +XXXXXXXXX                                                                        9   20
*280.000   +XXXXX                                                                            5   25
*315.000   +XXX                                                                              3   28
*350.000   +XX                                                                               2   30
*385.063   +XXX                                                                              3   33
*420.000   +XX                                                                               2   35
*455.060   +XXXXX                                                                            5   40
*490.000   +XX                                                                               2   42
*525.000   +X                                                                                1   43
*560.000   +X                                                                                1   44
*595.000   +X                                                                                1   45
*630.000   +X                                                                                1   46
*665.000   +XXX                                                                              3   49
*700.000   +X                                                                                1   50
*LAST      +                                                                                 0   50
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                5    10    15    20    25    30    35    40    45    50    55    60    65    70    75    80
```

```
            run18

HISTOGRAM OF VARIABLE     2 tsvn
                                     SYMBOL   COUNT      MEAN      ST.DEV.
                                       X        50     345.740    171.846
                              EACH SYMBOL REPRESENTS         1 OBSERVATIONS
INTERVAL                                                                                      FREQUENCY
NAME            5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*0.00000  +X                                                                                   1    1
*35.0000  +X                                                                                   1    2
*70.0000  +                                                                                    0    2
*105.000  +XX                                                                                  2    4
*140.000  +                                                                                    0    4
*175.000  +XXX                                                                                 3    7
*210.000  +XX                                                                                  2    9
*245.000  +XXXXX                                                                               5   14
*280.000  +XXXXXX                                                                              6   20
*315.000  +XXXXXX                                                                              6   26
*350.000  +XXX                                                                                 3   29
*385.000  +X                                                                                   1   30
*420.000  +XXX                                                                                 3   33
*455.000  +XXX                                                                                 3   36
*490.000  +XXXX                                                                                4   40
*525.000  +XX                                                                                  2   42
*560.000  +XX                                                                                  2   44
*595.000  +                                                                                    0   44
*630.000  +XX                                                                                  2   46
*665.000  +XX                                                                                  2   48
*700.000  +XX                                                                                  2   50
*LAST     +                                                                                    0   50
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
        run18

HISTOGRAM OF VARIABLE    3 tsvh
                               SYMBOL  COUNT     MEAN      ST.DEV.
                                  X      50     371.480    170.459
                       EACH SYMBOL REPRESENTS         1 OBSERVATIONS
INTERVAL                                                                              FREQUENCY
NAME          5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*0.00000  +                                                                                  0    0
*35.0000  +X                                                                                 1    1
*70.0000  +X                                                                                 1    2
*105.000  +                                                                                  0    2
*140.300  +XX                                                                                2    4
*175.000  +X                                                                                 1    5
*210.600  +XX                                                                                2    7
*245.000  +XX                                                                                2    9
*280.000  +XXXXXXXX                                                                          8   17
*315.000  +XXXXX                                                                             5   22
*350.000  +XXXXX                                                                             5   27
*385.000  +XX                                                                                2   29
*420.000  +XXX                                                                               3   32
*455.000  +X                                                                                 1   33
*490.000  +XXX                                                                               3   36
*525.000  +XXXXX                                                                             5   41
*560.000  +XX                                                                                2   43
*595.000  +X                                                                                 1   44
*630.000  +                                                                                  0   44
*665.000  +XX                                                                                2   46
*700.000  +XXX                                                                               3   49
*LAST     +X                                                                                 1   50
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
run19

HISTOGRAM OF VARIABLE    1 tsvl
                                 SYMBOL   COUNT      MEAN      ST.DEV.
                                   X       230    3741.914     158.095
                        EACH SYMBOL REPRESENTS          1 OBSERVATIONS
INTERVAL                                                                          FREQUENCY
NAME              5   10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*3350.00  +                                                                                   0    0
*3375.00  +XX                                                                                 2    2
*3400.00  +X                                                                                  1    3
*3425.00  +XXX                                                                                3    6
*3450.00  +XXXX                                                                               4   10
*3475.00  +XXXX                                                                               4   14
*3500.00  +XX                                                                                 2   16
*3525.00  +XXXXXX                                                                             6   22
*3550.00  +XXXXXXXXX                                                                          9   31
*3575.00  +XXXXX                                                                              5   36
*3600.00  +XXXXXX                                                                             6   42
*3625.00  +XXXXXXXXXXXX                                                                      12   54
*3650.00  +XXXXXXXXXXXXXXX                                                                   15   69
*3675.00  +XXXXXX                                                                             6   75
*3700.00  +XXXXXXXXXXXXXXXXX                                                                 17   92
*3725.00  +XXXXXX                                                                             6   98
*3750.00  +XXXXXXXXXXXXXX                                                                    14  112
*3775.00  +XXXXXXXXXXXXXXXX                                                                  16  128
*3800.00  +XXXXXXXXXXXXXXXXXXXX                                                              20  148
*3825.00  +XXXXXXXXXXXX                                                                      12  160
*3850.00  +XXXXXXXXXXXXX                                                                     13  173
*3875.00  +XXXXXXXXXX                                                                        10  183
*3900.00  +XXXXXXXXXXXX                                                                      12  195
*3925.00  +XXXXXXXXXXXX                                                                      12  207
*3950.00  +XXX                                                                                3  210
*3975.00  +XXXXX                                                                              5  215
*4000.00  +XXX                                                                                3  218
*4025.00  +XXXX                                                                               4  222
*4050.00  +XX                                                                                 2  224
*4075.00  +X                                                                                  1  225
*4100.00  +XX                                                                                 2  227
*4125.00  +XX                                                                                 2  229
*4150.00  +X                                                                                  1  230
*LAST     +                                                                                   0  230
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                  5   10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
        run19

HISTOGRAM OF VARIABLE     2 tsvn
                                   SYMBOL   COUNT      MEAN      ST DEV.
                                     X       230    4237.800     127.196
                         EACH SYMBOL REPRESENTS         1 OBSERVATIONS
INTERVAL                                                                          FREQUENCY
NAME            5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*3900.00   +                                                                                   0    0
*3925.00   +X                                                                                  1    1
*3950.00   +X                                                                                  1    2
*3975.00   +X                                                                                  1    3
*4000.00   +XXX                                                                                3    6
*4025.00   +XXXXX                                                                              5   11
*4050.00   +XXXXXXXX                                                                           8   19
*4075.00   +XXXXXX                                                                             6   25
*4100.00   +XXXXXXXXXXXXXX                                                                    14   39
*4125.00   +XXXXXX                                                                             6   45
*4150.00   +XXXXXXXXXX                                                                        10   55
*4175.00   +XXXXXXXXXXXXXXXXX                                                                 17   72
*4200.00   +XXXXXXXXXXXXXXXXX                                                                 17   89
*4225.00   +XXXXXXXXXXXXXX                                                                    14  103
*4250.00   +XXXXXXXXXXXXXXXXX                                                                 17  120
*4275.00   +XXXXXXXXXXXXXXXXXXXXXXX                                                           23  143
*4300.00   +XXXXXXXXXXXX                                                                      12  155
*4325.00   +XXXXXXXXXXXXXXXXX                                                                 17  172
*4350.00   +XXXXXXXXXXXXXX                                                                    14  186
*4375.00   +XXXXXXXXXXXXXXX                                                                   15  201
*4400.00   +XXXXXXX                                                                            7  208
*4425.00   +XXXXXXX                                                                            7  215
*4450.00   +XXXXX                                                                              5  220
*4475.00   +XX                                                                                 2  222
*4500.00   +XXX                                                                                3  225
*4525.00   +                                                                                   0  225
*4550.00   +XXXX                                                                               4  229
*4575.00   +X                                                                                  1  230
*LAST      +                                                                                   0  230
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
            run19

HISTOGRAM OF VARIABLE     3 tsvh
                                     SYMBOL  COUNT      MEAN      ST.DEV.
                                       X      230     4630.847     103.544
                          EACH SYMBOL REPRESENTS           1 OBSERVATIONS
INTERVAL                                                                                  FREQUENCY
NAME          5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*4375.00 +                                                                                     0    0
*4400.00 +XX                                                                                   2    2
*4425.00 +XXX                                                                                  3    5
*4450.00 +XXXXXXX                                                                              7   12
*4475.00 +XXXXX                                                                                5   17
*4500.00 +XXXXXXXX                                                                             8   25
*4525.00 +XXXXXXXXXXX                                                                         11   36
*4550.00 +XXXXXXXXXXXX                                                                        12   48
*4575.00 +XXXXXXXXXXXXXXXXXXXXX                                                               21   69
*4600.00 +XXXXXXXXXXXXXXXXX                                                                   17   86
*4625.00 +XXXXXXXXXXXXXXXXXXXXXX                                                              22  108
*4650.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                      30  138
*4675.00 +XXXXXXXXXXXXXXX                                                                     15  153
*4700.00 +XXXXXXXXXXXXXXXXXX                                                                  18  171
*4725.00 +XXXXXXXXXXXXXXXX                                                                    16  187
*4750.00 +XXXXXXXXXXXXXXX                                                                     15  202
*4775.00 +XXXXXXXXXX                                                                          10  212
*4800.00 +XXXXXX                                                                               6  218
*4825.00 +XXXX                                                                                 4  222
*4850.00 +XX                                                                                   2  224
*4875.00 +XXXX                                                                                 4  229
*4900.00 +X                                                                                    1  229
*LAST    +X                                                                                    1  230
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
        run20

HISTOGRAM OF VARIABLE     1 tsvl
                              SYMBOL   COUNT      MEAN      ST.DEV.
                                X        230    2806.326    311.884
                        EACH SYMBOL REPRESENTS        1 OBSERVATIONS
INTERVAL                                                                                FREQUENCY
NAME          5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80   INT. CUM.
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*1900.00 +                                                                                     0    0
*2000.00 +X                                                                                    1    1
*2100.00 +XX                                                                                   2    3
*2200.00 +XXXXXXX                                                                              7   10
*2300.00 +XXX                                                                                  3   13
*2400.00 +XXXXXXXXX                                                                            9   22
*2500.00 +XXXXXXXXXXXXXXX                                                                     15   37
*2600.00 +XXXXXXXXXXXXXXXXXX                                                                  18   55
*2700.00 +XXXXXXXXXXXXXXXXXXXXXXXXXX                                                          26   81
*2800.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                      30  111
*2900.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                    32  143
*3000.00 +XXXXXXXXXXXXXXXXXXXXXXXXXX                                                          26  169
*3100.00 +XXXXXXXXXXXXXXXXXXXX                                                                20  189
*3200.00 +XXXXXXXXXXXXXXXXX                                                                   17  206
*3300.00 +XXXXXXXXXXXXXX                                                                      14  220
*3400.00 +XXXX                                                                                 4  224
*3500.00 +XXXX                                                                                 4  228
*3600.00 +X                                                                                    1  229
*3700.00 +X                                                                                    1  230
*LAST    +                                                                                     0  230
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
                run20

HISTOGRAM OF VARIABLE     2 tsvn
                                        SYMBOL   COUNT       MEAN      ST.DEV.
                                          X        230     3278.540     305.638
                              EACH SYMBOL REPRESENTS          1 OBSERVATIONS
INTERVAL                                                                                  FREQUENCY
NAME            5    10    15    20    25    30    35    40    45    50    55    60    65    70    75    80   INT. CUM.
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*2300.00 +                                                                                    0     0
*2400.00 +X                                                                                   1     1
*2500.00 +X                                                                                   1     2
*2600.00 +X                                                                                   1     3
*2700.00 +XXXXXXX                                                                             7    10
*2800.00 +XXXXX                                                                               5    15
*2900.00 +XXXXXXXXXXXXXX                                                             14    29
*3000.00 +XXXXXXXXXXX                                                                 11    40
*3100.00 +XXXXXXXXXXXXXXXXXXXXXXXXX                                                   25    65
*3200.00 +XXXXXXXXXXXXXXXXXXXXXXXX                                                    24    89
*3300.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                            32   121
*3400.00 +XXXXXXXXXXXXXXXXXXXXX                                                       21   142
*3500.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                             31   173
*3600.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXX                                                 27   200
*3700.00 +XXXXXXXXXXXX                                                                12   212
*3800.00 +XXXXXXXXXX                                                                  10   222
*3900.00 +XXXXX                                                                        5   227
*4000.00 +XX                                                                           2   229
*4100.00 +                                                                             0   229
*4200.00 +X                                                                            1   230
*LAST    +                                                                             0   230
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                5    10    15    20    25    30    35    40    45    50    55    60    65    70    75    80
```

```
run20

HISTOGRAM OF VARIABLE    3 tsvh
                                   SYMBOL  COUNT      MEAN      ST.DEV.
                                     X      230    3695.290    293.693
                         EACH SYMBOL REPRESENTS        1 OBSERVATIONS
INTERVAL                                                                                  FREQUENCY
NAME          5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
        +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*2700.00 +                                                                                   0    0
*2800.00 +X                                                                                  1    1
*2900.00 +                                                                                   0    1
*3000.00 +X                                                                                  1    2
*3100.00 +XXX                                                                                3    5
*3200.00 +XXXXXXXX                                                                           8   13
*3300.00 +XXXXXXXXXX                                                                        10   23
*3400.00 +XXXXXXXXXXXXXX                                                                    14   37
*3500.00 +XXXXXXXXXXXXXXX                                                                   15   52
*3600.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                   31   83
*3700.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                            38  121
*3800.00 +XXXXXXXXXXXXXXXXXXX                                                               19  140
*3900.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXX                                                       27  167
*4000.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                34  201
*4100.00 +XXXXXXXXXX                                                                        10  211
*4200.00 +XXXXXXXXXXX                                                                       11  222
*4300.00 +XXXXXX                                                                             6  228
*4400.00 +X                                                                                  1  229
*4500.00 +                                                                                   0  229
*4600.00 +X                                                                                  1  230
*LAST    +                                                                                   0  230
        +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
          run21

HISTOGRAM OF VARIABLE     1 tsvl
                              SYMBOL  COUNT      MEAN      ST.DEV.
                                X      230     1897.621     369.323
                        EACH SYMBOL REPRESENTS       1 OBSERVATIONS
INTERVAL                                                                         FREQUENCY
NAME           5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80   INT. CUM.
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*700.000 +                                                                                   0    0
*800.000 +X                                                                                  1    1
*900.000 +X                                                                                  1    2
*1000.00 +X                                                                                  1    3
*1100.00 +X                                                                                  1    4
*1200.00 +XXXX                                                                               4    8
*1300.00 +XXXXX                                                                              5   13
*1400.00 +XXXXX                                                                              5   18
*1500.00 +XXXXXXXXXXXXX                                                             13   31
*1600.00 +XXXXXXXXXXXXXXXXXXX                                                       19   50
*1700.00 +XXXXXXXXXXXX                                                              12   62
*1800.00 +XXXXXXXXXXXXXXXXXXXXXXX                                                   23   85
*1900.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                             29  114
*2000.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                           31  145
*2100.00 +XXXXXXXXXXXXXXXXXXXXXXXXX                                                 25  170
*2200.00 +XXXXXXXXXXXXXXX                                                           15  185
*2300.00 +XXXXXXXXXXXX                                                              12  197
*2400.00 +XXXXXXXXXXXXXXX                                                           15  212
*2500.00 +XXXXX                                                                      5  217
*2600.00 +XXXXXXXX                                                                   8  225
*2700.00 +XX                                                                         2  227
*2800.00 +X                                                                          1  228
*2900.00 +                                                                           0  228
*3000.00 +XX                                                                         2  230
*LAST    +                                                                           0  230
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
               5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
run21

HISTOGRAM OF VARIABLE    2 tsvn
                              SYMBOL  COUNT     MEAN      ST.DEV.
                                X      230    2341.948    373.011
                         EACH SYMBOL REPRESENTS        1 OBSERVATIONS
INTERVAL                                                                            FREQUENCY
NAME          5   10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*1100.00 +                                                                                    0    0
*1200.00 +X                                                                                   1    1
*1300.00 +                                                                                    0    1
*1400.00 +XX                                                                                  2    3
*1500.00 +X                                                                                   1    4
*1600.00 +XXX                                                                                 3    7
*1700.00 +XXXX                                                                                4   11
*1800.00 +XXXXX                                                                               5   16
*1900.00 +XXXXXXXXXXX                                                                        11   27
*2000.00 +XXXXXXXXXXXXXXXX                                                                   16   43
*2100.00 +XXXXXXXXXXXXX                                                                      13   56
*2200.00 +XXXXXXXXXXXXXXXXXXXX                                                               20   76
*2300.00 +XXXXXXXXXXXXXXXXXXXXXXXXX                                                          25  101
*2400.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                  33  134
*2500.00 +XXXXXXXXXXXXXXXXXXXXXXX                                                            23  157
*2600.00 +XXXXXXXXXXXXXXXXXXXXX                                                              21  178
*2700.00 +XXXXXXXXXXX                                                                        11  189
*2800.00 +XXXXXXXXXXXXXXXXXX                                                                 18  207
*2900.00 +XXXXX                                                                               5  212
*3000.00 +XXXXXXXXXX                                                                         10  222
*3100.00 +XXXX                                                                                4  226
*3200.00 +XX                                                                                  2  228
*3300.00 +                                                                                    0  228
*3400.00 +X                                                                                   1  229
*3500.00 +X                                                                                   1  230
*LAST    +                                                                                    0  230
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              5   10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
run21

HISTOGRAM OF VARIABLE    3 tsvh
                                        SYMBOL  COUNT      MEAN      ST.DEV.
                                          X      230    2786.587     364.388
                               EACH SYMBOL REPRESENTS          1 OBSERVATIONS
INTERVAL                                                                                   FREQUENCY
NAME           5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*1600.00  +                                                                                  0    0
*1700.00  +X                                                                                 1    1
*1800.00  +X                                                                                 1    2
*1900.00  +X                                                                                 1    3
*2000.00  +X                                                                                 1    4
*2100.00  +XXXX                                                                              4    8
*2200.00  +XXXX                                                                              4   12
*2300.00  +XXXXXXXXX                                                                         9   21
*2400.00  +XXXXXXXXXXXXX                                                                    13   34
*2500.00  +XXXXXXXXXXXXX                                                                    13   47
*2600.00  +XXXXXXXXXXXXXXXXXXXX                                                             20   67
*2700.00  +XXXXXXXXXXXXXXXXXXX                                                              19   86
*2800.00  +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                   30  116
*2900.00  +XXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                     28  144
*3000.00  +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                   30  174
*3100.00  +XXXXXXXXX                                                                         9  183
*3200.00  +XXXXXXXXXXXXXXXXXX                                                               18  201
*3300.00  +XXXXXXXXXX                                                                       10  211
*3400.00  +XXXXXXX                                                                           7  218
*3500.00  +XXXXXXX                                                                           7  225
*3600.00  +XXX                                                                               3  228
*3700.00  +                                                                                  0  228
*3800.00  +X                                                                                 1  229
*LAST     +X                                                                                 1  230
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
               5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
          run22

HISTOGRAM OF VARIABLE     1 tsvl
                                 SYMBOL  COUNT     MEAN      ST.DEV.
                                   X      230    4066.184     160.771
                        EACH SYMBOL REPRESENTS         1 OBSERVATIONS
INTERVAL                                                                            FREQUENCY
NAME           5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*3550.00 +                                                                                     0    0
*3600.00 +X                                                                                    1    1
*3650.00 +                                                                                     0    1
*3700.00 +XX                                                                                   2    3
*3750.00 +XX                                                                                   2    5
*3800.00 +XXXXXXX                                                                              7   12
*3850.00 +XXXXXXXXXXXXX                                                                       13   25
*3900.00 +XXXXXXXXXXXX                                                                        12   37
*3950.00 +XXXXXXXXXXXXXXXXXXX                                                                 19   56
*4000.00 +XXXXXXXXXXXXXXXXXXXXXXXX                                                            24   80
*4050.00 +XXXXXXXXXXXXXXXXXX                                                                  18   98
*4100.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                        28  126
*4150.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                       29  155
*4200.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                       29  184
*4250.00 +XXXXXXXXXXXXXXXXXXXXX                                                               21  205
*4300.00 +XXXXXXXXXX                                                                          10  215
*4350.00 +XXXXXXXX                                                                             8  223
*4400.00 +XX                                                                                   2  225
*4450.00 +XXXX                                                                                 4  229
*4500.00 +X                                                                                    1  230
*4550.00 +                                                                                     0  230
*4600.00 +                                                                                     0  230
*LAST    +                                                                                     0  230
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
               5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
            run22

HISTOGRAM OF VARIABLE    2 tsvn
                                   SYMBOL   COUNT      MEAN      ST.DEV.
                                     X       230     4499.586    129.067
                          EACH SYMBOL REPRESENTS        1 OBSERVATIONS
INTERVAL                                                                                      FREQUENCY
NAME            5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*4100.00 +                                                                                     0    0
*4150.00 +X                                                                                    1    1
*4200.00 +X                                                                                    1    2
*4250.00 +XX                                                                                   2    4
*4300.00 +XXXXXXXXXXXXXX                                                                      14   18
*4350.00 +XXXXXXXXXXXXXXXX                                                                    16   34
*4400.00 +XXXXXXXXXXXXXXXXXXXXX                                                               21   55
*4450.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                        28   83
*4500.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                       29  112
*4550.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                    32  144
*4600.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                 35  179
*4650.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXX                                                         27  206
*4700.00 +XXXXXXXXXXXX                                                                        12  218
*4750.00 +XXXXX                                                                                5  223
*4800.00 +XXXX                                                                                 4  227
*4850.00 +XXX                                                                                  3  230
*LAST    +                                                                                     0  230
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
          run22

HISTOGRAM OF VARIABLE    3 tsvh
                                   SYMBOL  COUNT     MEAN      ST.DEV.
                                     X      230    4850.672    106.729
                             EACH SYMBOL REPRESENTS        1 OBSERVATIONS
INTERVAL
NAME          5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80   FREQUENCY
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+  INT. CUM.
*4550.00 +                                                                                    0     0
*4600.00 +XX                                                                                  2     2
*4650.00 +XXXXXX                                                                              6     8
*4700.00 +XXXXXXXXXXXXXXX                                                                    15    23
*4750.00 +XXXXXXXXXXXXXXXXXXX                                                                19    42
*4800.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                    31    73
*4850.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                               36   109
*4900.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                     46   155
*4950.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                 34   189
*5000.00 +XXXXXXXXXXXXXXXXXXXXXXX                                                            23   212
*5050.00 +XXXXXXXXXXX                                                                        11   223
*5100.00 +XXXXX                                                                               5   228
*5150.00 +XX                                                                                  2   230
*LAST    +                                                                                    0   230
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
             run23

HISTOGRAM OF VARIABLE    1 tsvl
                                    SYMBOL   COUNT      MEAN      ST.DEV.
                                      X       230     2994.540    347.790
                          EACH SYMBOL REPRESENTS        1 OBSERVATIONS
INTERVAL                                                                                  FREQUENCY
NAME          5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
        +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*1900.00 +                                                                                    0    0
*2000.00 +X                                                                                   1    1
*2100.00 +X                                                                                   1    2
*2200.00 +                                                                                    0    2
*2300.00 +XXXXXX                                                                              6    8
*2400.00 +XXXXX                                                                               5   13
*2500.00 +XXXX                                                                                4   17
*2600.00 +XXXXXXXXXXXXX                                                                      13   30
*2700.00 +XXXXXXXXXXXXX                                                                      13   43
*2800.00 +XXXXXXXXXXXXXXXXXXXXXX                                                             22   65
*2900.00 +XXXXXXXXXXXXXXXXXXXXXX                                                             22   87
*3000.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                       28  115
*3100.00 +XXXXXXXXXXXXXXXXXXXXXXXX                                                           24  139
*3200.00 +XXXXXXXXXXXXXXXXXXXXXXXXX                                                          25  164
*3300.00 +XXXXXXXXXXXXXXXXXXXXX                                                              21  185
*3400.00 +XXXXXXXXXXXXXXXXXXXX                                                               20  205
*3500.00 +XXXXXXXX                                                                            8  213
*3600.00 +XXXXXXXXX                                                                           9  222
*3700.00 +XXXX                                                                                4  226
*3800.00 +XXX                                                                                 3  229
*LAST    +X                                                                                   1  230
        +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              5    10   15   20   25   30   35   40   45   50   55   60   55   70   75   80
```

```
          run23

HISTOGRAM OF VARIABLE    2 tsvn
                                SYMBOL  COUNT      MEAN      ST.DEV.
                                  X      230     3408.666     341.009
                         EACH SYMBOL REPRESENTS         1 OBSERVATIONS
INTERVAL                                                                               FREQUENCY
NAME          5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*2300.00 +                                                                                    0    0
*2400.00 +X                                                                                   1    1
*2500.00 +                                                                                    0    1
*2600.00 +X                                                                                   1    2
*2700.00 +XXXX                                                                                4    6
*2800.00 +XXXXXX                                                                              6   12
*2900.00 +XXX                                                                                 3   15
*3000.00 +XXXXXXXXXXXXXXX                                                                    15   30
*3100.00 +XXXXXXXXXXXX                                                                       12   42
*3200.00 +XXXXXXXXXXXXXXXXXXXXX                                                              21   63
*3300.00 +XXXXXXXXXXXXXXXXXXXX                                                               20   83
*3400.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                   32  115
*3500.00 +XXXXXXXXXXXXXXXXXXXX                                                               20  135
*3600.00 +XXXXXXXXXXXXXXXXXXXXXXXXXX                                                         26  161
*3700.00 +XXXXXXXXXXXXXXXXXXXX                                                               20  181
*3800.00 +XXXXXXXXXXXXXXXXXXXXXXXX                                                           24  205
*3900.00 +XXXXXXXXXX                                                                         10  215
*4000.00 +XXXXXXXX                                                                            8  223
*4100.00 +XXXX                                                                                4  227
*4200.00 +XX                                                                                  2  229
*LAST    +X                                                                                   1  230
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
run23

HISTOGRAM OF VARIABLE    3 tsvh
                                  SYMBOL  COUNT      MEAN      ST.DEV.
                                    X      230     3779.031     330.076
                         EACH SYMBOL REPRESENTS         1 OBSERVATIONS
INTERVAL                                                                              FREQUENCY
NAME          5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*2700.00 +                                                                                  0    0
*2800.00 +X                                                                                 1    1
*2900.00 +                                                                                  0    1
*3000.00 +X                                                                                 1    2
*3100.00 +XXXX                                                                              4    6
*3200.00 +XXXXX                                                                             5   11
*3300.00 +XXXXXXXXX                                                                         9   20
*3400.00 +XXXXXXXXXXX                                                                      11   31
*3500.00 +XXXXXXXXXXXX                                                                     12   43
*3600.00 +XXXXXXXXXXXXXXXXXXXXXX                                                           22   65
*3700.00 +XXXXXXXXXXXXXXXXXXXXXXXXXX                                                       26   91
*3800.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                33  124
*3900.00 +XXXXXXXXXXXXXXXXX                                                                17  141
*4000.00 +XXXXXXXXXXXXXXXXXXXXXXX                                                          23  164
*4100.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                 32  196
*4200.00 +XXXXXXXXXXX                                                                      11  207
*4300.00 +XXXXXXXXXXXXX                                                                    13  220
*4400.00 +XXXXX                                                                             5  225
*4500.00 +XXX                                                                               3  228
*4600.00 +X                                                                                 1  229
*LAST    +X                                                                                 1  230
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
run24

HISTOGRAM OF VARIABLE    1 tsv1
                                        SYMBOL   COUNT      MEAN      ST.DEV.
                                          X       230     1950.017    414.892
                               EACH SYMBOL REPRESENTS         1 OBSERVATIONS
INTERVAL                                                                                   FREQUENCY
NAME            5    10    15    20    25    30    35    40    45    50    55    60    65    70    75    80  INT. CUM.
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*700.000  +X                                                                                  1    1
*800.000  +                                                                                   0    1
*900.000  +X                                                                                  1    2
*1000.00  +XX                                                                                 2    4
*1100.00  +XX                                                                                 2    6
*1200.00  +XX                                                                                 2    8
*1300.00  +XXXXXXX                                                                            7   15
*1400.00  +XXXXXXXX                                                                           8   23
*1500.00  +XXXXXXXX                                                                           8   31
*1600.00  +XXXXXXXXXXXXXXXXX                                                                 17   48
*1700.00  +XXXXXXXXX                                                                          9   57
*1800.00  +XXXXXXXXXXXXXXXXXXXX                                                              20   77
*1900.00  +XXXXXXXXXXXXXXXXXXXX                                                              20   97
*2000.00  +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                  32  129
*2100.00  +XXXXXXXXXXXXXXXXXXXX                                                              20  149
*2200.00  +XXXXXXXXXXXXXXXXXXXXXXXX                                                          24  173
*2300.00  +XXXXXXXXXXXXX                                                                     13  186
*2400.00  +XXXXXXXXXXXXXXX                                                                   15  201
*2500.00  +XXXXXXX                                                                            7  208
*2600.00  +XXXXXX                                                                             6  214
*2700.00  +XXXXXXXXX                                                                          9  223
*2800.00  +XXX                                                                                3  226
*2900.00  +XX                                                                                 2  228
*3000.00  +                                                                                   0  228
*3100.00  +X                                                                                  1  229
*3200.00  +X                                                                                  1  230
*LAST     +                                                                                   0  230
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                5    10    15    20    25    30    35    40    45    50    55    60    65    70    75    80
```

```
            run24

HISTOGRAM OF VARIABLE     2 tsvn
                                  SYMBOL   COUNT      MEAN       ST.DEV.
                                    X        230    2341.388     417.882
                          EACH SYMBOL REPRESENTS          1 OBSERVATIONS
INTERVAL                                                                                   FREQUENCY
NAME            5    10    15    20    25    30    35    40    45    50    55    60    65    70    75    80  INT. CUM.
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*1000.00  +                                                                                  0    0
*1100.00  +X                                                                                 1    1
*1200.00  +                                                                                  0    1
*1300.00  +X                                                                                 1    2
*1400.00  +XX                                                                                2    4
*1500.00  +XX                                                                                2    6
*1600.00  +XXX                                                                               3    9
*1700.00  +XXXXXX                                                                            6   15
*1800.00  +XXXXXX                                                                            6   21
*1900.00  +XXXXXXXXXXXXXX                                                                   14   35
*2000.00  +XXXXXXXXXXXXXXX                                                                  15   50
*2100.00  +XXXXXXX                                                                           7   57
*2200.00  +XXXXXXXXXXXXXXXXXXXXX                                                            21   78
*2300.00  +XXXXXXXXXXXXXXXXXXXXXXXX                                                         24  102
*2400.00  +XXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                     28  130
*2500.00  +XXXXXXXXXXXXXXXXXXX                                                              19  149
*2600.00  +XXXXXXXXXXXXXXXXXXXXXXXX                                                         24  173
*2700.00  +XXXXXXXXXXX                                                                      11  184
*2800.00  +XXXXXXXXXXXXXXXX                                                                 16  200
*2900.00  +XXXXXXXXX                                                                         9  209
*3000.00  +XXXX                                                                              4  213
*3100.00  +XXXXXXXXXXX                                                                      11  224
*3200.00  +XX                                                                                2  226
*3300.00  +XX                                                                                2  228
*3400.00  +X                                                                                 1  229
*3500.00  +                                                                                  0  229
*3600.00  +X                                                                                 1  230
*LAST     +                                                                                  0  230
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                5    10    15    20    25    30    35    40    45    50    55    60    65    70    75    80
```

```
           run24

HISTOGRAM OF VARIABLE     3 tsvh
                                        SYMBOL  COUNT     MEAN      ST.DEV.
                                          X      230    2734.449    409.852
                              EACH SYMBOL REPRESENTS         1 OBSERVATIONS
INTERVAL                                                                                        FREQUENCY
NAME              5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*1400.00 +                                                                                      0    0
*1500.00 +X                                                                                     1    1
*1600.00 +                                                                                      0    1
*1700.00 +XX                                                                                    2    3
*1800.00 +                                                                                      0    3
*1900.00 +XX                                                                                    2    5
*2000.00 +XXXXX                                                                                 5   10
*2100.00 +XXXX                                                                                  4   14
*2200.00 +XXXXXXX                                                                               7   21
*2300.00 +XXXXXXXXXXXXX                                                                        13   34
*2400.00 +XXXXXXXXXXXX                                                                         12   46
*2500.00 +XXXXXXXXXXXXXXXX                                                                     16   62
*2600.00 +XXXXXXXXXXXXXXXX                                                                     16   78
*2700.00 +XXXXXXXXXXXXXXXXXXXXXXXXX                                                            25  103
*2800.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                       30  133
*2900.00 +XXXXXXXXXXXXXXXXXXXXX                                                                21  154
*3000.00 +XXXXXXXXXXXXXXXXXXXXXX                                                               22  176
*3100.00 +XXXXXXXXX                                                                             9  185
*3200.00 +XXXXXXXXXXXXXXXX                                                                     16  201
*3300.00 +XXXXXXXXX                                                                             9  210
*3400.00 +XXXXXXX                                                                               7  217
*3500.00 +XXXXXXX                                                                               7  224
*3600.00 +XXX                                                                                   3  227
*3700.00 +X                                                                                     1  228
*3800.00 +X                                                                                     1  229
*3900.00 +X                                                                                     1  230
*LAST    +                                                                                      0  230
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                  5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
run25

HISTOGRAM OF VARIABLE    1 tsvl
                                      SYMBOL   COUNT      MEAN      ST.DEV.
                                        X       230     4304.905    166.295
                             EACH SYMBOL REPRESENTS        1 OBSERVATIONS
INTERVAL                                                                                           FREQUENCY
NAME              5    10    15    20    25    30    35    40    45    50    55    60    65    70    75    80  INT. CUM.
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*3750.00 +                                                                                     0     0
*3800.00 +X                                                                                    1     1
*3850.00 +                                                                                     0     1
*3900.00 +X                                                                                    1     2
*3950.00 +X                                                                                    1     3
*4000.00 +XXXX                                                                                 4     7
*4050.00 +XXXXXXXXXXX                                                                         11    18
*4100.00 +XXXXXXXXX                                                                            9    27
*4150.00 +XXXXXXXXXXXXXXXXXXXXX                                                               21    48
*4200.00 +XXXXXXXXXXXXX                                                                       13    61
*4250.00 +XXXXXXXXXXXXXXXXXXXX                                                                20    81
*4300.00 +XXXXXXXXXXXXXXXXXXXXXXXXXX                                                          26   107
*4350.00 +XXXXXXXXXXXXXXXXXXXXXXX                                                             23   130
*4400.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                        28   158
*4450.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                        28   186
*4500.00 +XXXXXXXXXXXXXXXXXXXXXX                                                              22   208
*4550.00 +XXXXXXXX                                                                             8   216
*4600.00 +XXXXXXX                                                                              7   223
*4650.00 +XXX                                                                                  3   226
*4700.00 +XXXX                                                                                 4   230
*LAST    +                                                                                     0   230
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                  5    10    15    20    25    30    35    40    45    50    55    60    65    70    75    80
```

```
                run25

HISTOGRAM OF VARIABLE     2 tsvn
                                        SYMBOL  COUNT      MEAN      ST.DEV.
                                          X      230     4700.594    135.241
                              EACH SYMBOL REPRESENTS          1 OBSERVATIONS
INTERVAL                                                                                          FREQUENCY
NAME           5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80   INT. CUM.
            +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*4250.00 +                                                                                          0    0
*4300.00 +X                                                                                         1    1
*4350.00 +                                                                                          0    1
*4400.00 +X                                                                                         1    2
*4450.00 +XXXXX                                                                                     5    7
*4500.00 +XXXXXXXXXXX                                                                              11   18
*4550.00 +XXXXXXXXXXXXXXXXX                                                                        17   35
*4600.00 +XXXXXXXXXXXXXXXXXXXXXX                                                                   22   57
*4650.00 +XXXXXXXXXXXXXXXXXXXXXXXXX                                                                25   82
*4700.00 +XXXXXXXXXXXXXXXXXXXXXXXXXX                                                               26  108
*4750.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                         32  140
*4800.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                     36  176
*4850.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXX                                                              27  203
*4900.00 +XXXXXXXXXXXXXX                                                                           14  217
*4950.00 +XXXXXX                                                                                    6  223
*5000.00 +XXXXX                                                                                     5  228
*5050.00 +XX                                                                                        2  230
*5100.00 +                                                                                          0  230
*5150.00 +                                                                                          0  230
*LAST    +                                                                                          0  230
            +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
               5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
                run25

HISTOGRAM OF VARIABLE    3 tsvh
                                  SYMBOL   COUNT      MEAN      ST.DEV.
                                     X       230    5025.857     113.463
                      EACH SYMBOL REPRESENTS           1 OBSERVATIONS
                                                                                         FREQUENCY
INTERVAL                                                                                 INT. CUM.
NAME           5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                                                                                          0    0
*4650.00  +                                                                               1    1
*4700.00  +X                                                                              0    1
*4750.00  +                                                                               4    5
*4800.00  +XXXX                                                                          12   17
*4850.00  +XXXXXXXXXXXX                                                                  18   35
*4900.00  +XXXXXXXXXXXXXXXXXX                                                            28   63
*4950.00  +XXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                  29   92
*5000.00  +XXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                 32  124
*5050.00  +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                              46  170
*5100.00  +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                34  204
*5150.00  +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                            13  217
*5200.00  +XXXXXXXXXXXXX                                                                  6  223
*5250.00  +XXXXXX                                                                         7  230
*5300.00  +XXXXXXX                                                                        0  230
*LAST     +
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
               5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
run26

HISTOGRAM OF VARIABLE    1 tsv1
                              SYMBOL  COUNT     MEAN      ST.DEV.
                                 X     230    3129.340    376.894
                        EACH SYMBOL REPRESENTS        1 OBSERVATIONS
INTERVAL                                                                                          FREQUENCY
NAME           5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80   INT. CUM.
            +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*2000.00 +                                                                                      0    0
*2100.00 +X                                                                                     1    1
*2200.00 +X                                                                                     1    2
*2300.00 +X                                                                                     1    3
*2400.00 +XXXXXX                                                                                6    9
*2500.00 +XXXX                                                                                  4   13
*2600.00 +XXXXX                                                                                 5   18
*2700.00 +XXXXXXXXXXXXX                                                                        13   31
*2800.00 +XXXXXXXXXXX                                                                          11   42
*2900.00 +XXXXXXXXXXXXXXXXXXX                                                                  19   61
*3000.00 +XXXXXXXXXXXXXXXXXXXXX                                                                21   82
*3100.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXX                                                          27  109
*3200.00 +XXXXXXXXXXXXXXXXXX                                                                   18  127
*3300.00 +XXXXXXXXXXXXXXXXXXXXX                                                                21  148
*3400.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                         28  176
*3500.00 +XXXXXXXXXXXXXXXXXX                                                                   18  194
*3600.00 +XXXXXXXXXXXXX                                                                        13  207
*3700.00 +XXXXXXXX                                                                              8  215
*3800.00 +XXXXXXXX                                                                              8  223
*3900.00 +XX                                                                                    2  225
*4000.00 +XXXX                                                                                  4  229
*4100.00 +X                                                                                     1  230
*LAST    +                                                                                      0  230
            +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
               5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
              run26

HISTOGRAM OF VARIABLE     2 tsvn
                              SYMBOL  COUNT     MEAN      ST.DEV.
                                X      23Ø    35Ø8.5Ø5     37Ø.232
                         EACH SYMBOL REPRESENTS        1 OBSERVATIONS
INTERVAL                                                                                FREQUENCY
NAME          5   1Ø   15   2Ø   25   3Ø   35   4Ø   45   5Ø   55   6Ø   65   7Ø   75   8Ø  INT. CUM.
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*23ØØ.ØØ +                                                                                  Ø    Ø
*24ØØ.ØØ +X                                                                                 1    1
*25ØØ.ØØ +                                                                                  Ø    1
*26ØØ.ØØ +X                                                                                 1    2
*27ØØ.ØØ +X                                                                                 1    3
*28ØØ.ØØ +XXXXXXX                                                                           7   1Ø
*29ØØ.ØØ +XXXX                                                                              4   14
*3ØØØ.ØØ +XXXXXX                                                                            6   2Ø
*31ØØ.ØØ +XXXXXXXXXXXX                                                                     12   32
*32ØØ.ØØ +XXXXXXXXXXXXX                                                                    13   45
*33ØØ.ØØ +XXXXXXXXXXXXXXXXXXXXX                                                            21   66
*34ØØ.ØØ +XXXXXXXXXXXXXXXXXXX                                                              19   85
*35ØØ.ØØ +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                   3Ø  115
*36ØØ.ØØ +XXXXXXXXXXXXXXXXXXX                                                              19  134
*37ØØ.ØØ +XXXXXXXXXXXXXXXXXXXX                                                             2Ø  154
*38ØØ.ØØ +XXXXXXXXXXXXXXXXXXXXXXX                                                          23  177
*39ØØ.ØØ +XXXXXXXXXXXXXXXXXXXXX                                                            21  198
*4ØØØ.ØØ +XXXXXXXXXXXX                                                                     12  21Ø
*41ØØ.ØØ +XXXXXXXXX                                                                         9  219
*42ØØ.ØØ +XXXXXX                                                                            6  225
*43ØØ.ØØ +XXXX                                                                              4  229
*44ØØ.ØØ +                                                                                  Ø  229
*45ØØ.ØØ +X                                                                                 1  23Ø
*LAST    +                                                                                  Ø  23Ø
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              5   1Ø   15   2Ø   25   3Ø   35   4Ø   45   5Ø   55   6Ø   65   7Ø   75   8Ø
```

```
run26

HISTOGRAM OF VARIABLE    3 tsvh
                              SYMBOL   COUNT      MEAN      ST.DEV.
                                X       23Ø     385Ø.183     36Ø.397
                        EACH SYMBOL REPRESENTS          1 OBSERVATIONS
INTERVAL                                                                              FREQUENCY
NAME          5   1Ø   15   2Ø   25   3Ø   35   4Ø   45   5Ø   55   6Ø   65   7Ø   75   8Ø   INT. CUM.
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*26ØØ.ØØ   +                                                                                Ø    Ø
*27ØØ.ØØ   +X                                                                               1    1
*28ØØ.ØØ   +                                                                                Ø    1
*29ØØ.ØØ   +                                                                                Ø    1
*3ØØØ.ØØ   +X                                                                               1    2
*31ØØ.ØØ   +XXX                                                                             3    5
*32ØØ.ØØ   +XXXXX                                                                           5   1Ø
*33ØØ.ØØ   +XXXXXXX                                                                         7   17
*34ØØ.ØØ   +XXXXXX                                                                          6   23
*35ØØ.ØØ   +XXXXXXXXXXXXXXXX                                                               16   39
*36ØØ.ØØ   +XXXXXXXXXXXXXX                                                                 14   53
*37ØØ.ØØ   +XXXXXXXXXXXXXXXXXXXXXXXX                                                       24   77
*38ØØ.ØØ   +XXXXXXXXXXXXXXXXXXXXXXXXXXX                                                    27  1Ø4
*39ØØ.ØØ   +XXXXXXXXXXXXXXXXXXXXXXXX                                                       24  128
*4ØØØ.ØØ   +XXXXXXXXXXXXXXXXX                                                              17  145
*41ØØ.ØØ   +XXXXXXXXXXXXXXXXXXXXXX                                                         22  167
*42ØØ.ØØ   +XXXXXXXXXXXXXXXXXXXXXXXXXX                                                     26  193
*43ØØ.ØØ   +XXXXXXXXXXXXX                                                                  13  2Ø6
*44ØØ.ØØ   +XXXXXXXXXXXXX                                                                  13  219
*45ØØ.ØØ   +XXXXX                                                                           5  224
*46ØØ.ØØ   +XXXX                                                                            4  228
*47ØØ.ØØ   +X                                                                               1  229
*48ØØ.ØØ   +X                                                                               1  23Ø
*LAST      +                                                                                Ø  23Ø
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              5   1Ø   15   2Ø   25   3Ø   35   4Ø   45   5Ø   55   6Ø   65   7Ø   75   8Ø
```

```
         run27

HISTOGRAM OF VARIABLE     1 tsv1
                                     SYMBOL   COUNT      MEAN      ST.DEV.
                                       X       230     1981.687    452.212
                           EACH SYMBOL REPRESENTS          1 OBSERVATIONS
INTERVAL                                                                                        FREQUENCY
NAME              5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*600.000  +                                                                                      0    0
*750.000  +X                                                                                     1    1
*900.000  +XXX                                                                                   3    4
*1050.00  +XX                                                                                    2    6
*1200.00  +XXX                                                                                   3    9
*1350.00  +XXXXXXXXXX                                                                           10   19
*1500.00  +XXXXXXXXXXXXXX                                                                       14   33
*1650.00  +XXXXXXXXXXXXXXXXXXXXX                                                                21   54
*1800.00  +XXXXXXXXXXXXXXXXXX                                                                   18   72
*1950.00  +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                       30  102
*2100.00  +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                           42  144
*2250.00  +XXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                        29  173
*2400.00  +XXXXXXXXXXXXXXX                                                                      15  188
*2550.00  +XXXXXXXXXXXXXXXXXX                                                                   18  206
*2700.00  +XXXXXXXXX                                                                             9  215
*2850.00  +XXXXXXXXX                                                                             9  224
*3000.00  +XXXX                                                                                  4  228
*3150.00  +X                                                                                     1  229
*3300.00  +X                                                                                     1  230
*LAST     +                                                                                      0  230
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                  5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
run27

HISTOGRAM OF VARIABLE    2 tsvn
                              SYMBOL   COUNT      MEAN       ST.DEV.
                                 X      230     2341.339     454.796
                       EACH SYMBOL REPRESENTS          1 OBSERVATIONS
                                                                                          FREQUENCY
INTERVAL                                                                                  INT. CUM.
NAME           5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
             +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*900.000     +                                                                               0    0
*1050.00     +X                                                                              1    1
*1200.00     +X                                                                              1    2
*1350.00     +XX                                                                             2    4
*1500.00     +XXX                                                                            3    7
*1650.00     +XXXXXXXXXX                                                                    10   17
*1800.00     +XXXXXXXXXX                                                                    10   27
*1950.00     +XXXXXXXXXXXXXXXXXXXXX                                                         21   48
*2100.00     +XXXXXXXXXXXXX                                                                 13   61
*2250.00     +XXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                 29   90
*2400.00     +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                       39  129
*2550.00     +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                30  159
*2700.00     +XXXXXXXXXXXXXXXXXXXX                                                          20  179
*2850.00     +XXXXXXXXXXXXXXXXXXXXXXXX                                                      24  203
*3000.00     +XXXXXXXX                                                                       8  211
*3150.00     +XXXXXXXXXXXX                                                                  12  223
*3300.00     +XXXX                                                                           4  227
*3450.00     +XX                                                                             2  229
*3600.00     +                                                                               0  229
*3750.00     +X                                                                              1  230
*LAST        +                                                                               0  230
             +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
               5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
                run27

HISTOGRAM OF VARIABLE     3 tsvh
                                    SYMBOL   COUNT      MEAN      ST.DEV.
                                      X        230    2702.617    447.440
                           EACH SYMBOL REPRESENTS         1 OBSERVATIONS
INTERVAL                                                                                   FREQUENCY
NAME             5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*1200.00   +                                                                                  0    0
*1350.00   +X                                                                                 1    1
*1500.00   +X                                                                                 1    2
*1650.00   +X                                                                                 1    3
*1800.00   +XXX                                                                               3    6
*1950.00   +XXXXX                                                                             5   11
*2100.00   +XXXXXXXXX                                                                         9   20
*2250.00   +XXXXXXXXXXXXXXXX                                                                 16   36
*2400.00   +XXXXXXXXXXXXXXXXX                                                                17   53
*2550.00   +XXXXXXXXXXXXXXXXXXXXXXX                                                          23   76
*2700.00   +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                           38  114
*2850.00   +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                   30  144
*3000.00   +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                33  177
*3150.00   +XXXXXXXXXXXXXX                                                                   14  191
*3300.00   +XXXXXXXXXXXXXXXXX                                                                17  208
*3450.00   +XXXXXXXXXXXX                                                                     12  220
*3600.00   +XXXXX                                                                             5  225
*3750.00   +XXX                                                                               3  228
*3900.00   +X                                                                                 1  229
*4050.00   +X                                                                                 1  230
*LAST      +                                                                                  0  230
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                 5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
run28

HISTOGRAM OF VARIABLE    1 tsv1
                                     SYMBOL  COUNT     MEAN      ST.DEV.
                                       X      230    3981.430    148.361
                               EACH SYMBOL REPRESENTS        1 OBSERVATIONS
INTERVAL                                                                                FREQUENCY
NAME           5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
              +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*3540.00 +                                                                                  0    0
*3580.00 +X                                                                                 1    1
*3620.00 +X                                                                                 1    2
*3660.00 +                                                                                  0    2
*3700.00 +XXXX                                                                              4    6
*3740.00 +XXXXXXX                                                                           7   13
*3780.00 +XXXXXXXXXXX                                                                      11   24
*3820.00 +XXXXXXXXXXX                                                                      11   35
*3860.00 +XXXXXXXXXXXXXX                                                                   14   49
*3900.00 +XXXXXXXXXXXXXXXXXXXX                                                             20   69
*3940.00 +XXXXXXXXXXXXXXXXXXXXX                                                            21   90
*3980.00 +XXXXXXXXXXXXXXXXXXX                                                              19  109
*4020.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                    29  138
*4060.00 +XXXXXXXXXXXXXXXXX                                                                17  155
*4100.00 +XXXXXXXXXXXXXXXXXXXXXX                                                           22  177
*4140.00 +XXXXXXXXXXXXXXXXXXXXXXXXX                                                        25  202
*4180.00 +XXXXXXXX                                                                          8  210
*4220.00 +XXXXXXXX                                                                          8  218
*4260.00 +XXXXXX                                                                            6  224
*4300.00 +X                                                                                 1  225
*4340.00 +XXXX                                                                              4  229
*LAST    +X                                                                                 1  230
              +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
               5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
              run20

HISTOGRAM OF VARIABLE    2 tsvn
                              SYMBOL   COUNT     MEAN      ST.DEV.
                                X       230    4237.800    127.196
                        EACH SYMBOL REPRESENTS         1 OBSERVATIONS
INTERVAL                                                                                     FREQUENCY
NAME           5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*3820.00 +                                                                                     0    0
*3860.00 +                                                                                     0    0
*3900.00 +                                                                                     0    0
*3940.00 +X                                                                                    1    1
*3980.00 +XXX                                                                                  3    4
*4020.00 +XXXXXXX                                                                              7   11
*4060.00 +XXXXXXXXX                                                                            9   20
*4100.00 +XXXXXXXXXXXXXXXXXXX                                                                 19   39
*4140.00 +XXXXXXXXXXXX                                                                        12   51
*4180.00 +XXXXXXXXXXXXXXXXXXXXXXX                                                             23   74
*4220.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXX                                                         27  101
*4260.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXX                                                         27  128
*4300.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXX                                                         27  155
*4340.00 +XXXXXXXXXXXXXXXXXXXXXXXX                                                            24  179
*4380.00 +XXXXXXXXXXXXXXXXXXXXXXXX                                                            24  203
*4420.00 +XXXXXXXXXX                                                                          10  213
*4460.00 +XXXXXXXX                                                                             8  221
*4500.00 +XXXX                                                                                 4  225
*4540.00 +XXX                                                                                  3  228
*4580.00 +XX                                                                                   2  230
*4620.00 +                                                                                     0  230
*LAST    +                                                                                     0  230
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
               5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
          run28

HISTOGRAM OF VARIABLE    3 tsvh
                                 SYMBOL  COUNT      MEAN      ST.DEV.
                                   X      230     4451.076     112.539
                         EACH SYMBOL REPRESENTS          1 OBSERVATIONS
INTERVAL                                                                                    FREQUENCY
NAME          5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
        +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*4060.00 +                                                                                    0    0
*4100.00 +                                                                                    0    0
*4140.00 +                                                                                    0    0
*4180.00 +                                                                                    0    0
*4220.00 +XXXX                                                                                4    4
*4260.00 +XXXXXXXX                                                                            8   12
*4300.00 +XXXXXXXXXXX                                                                        11   23
*4340.00 +XXXXXXXXXXXXXXXXXXX                                                                19   42
*4380.00 +XXXXXXXXXXXXXXXXXXX                                                                19   61
*4420.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                     30   91
*4460.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                      29  120
*4500.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                  33  153
*4540.00 +XXXXXXXXXXXXXXXXXXXXXXXXX                                                          25  178
*4580.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXX                                                        27  205
*4620.00 +XXXXXXXXXX                                                                         10  215
*4660.00 +XXXXXXX                                                                             7  222
*4700.00 +XXX                                                                                 3  225
*4740.00 +XXXX                                                                                4  229
*4780.00 +X                                                                                   1  230
*4820.00 +                                                                                    0  230
*4860.00 +                                                                                    0  230
*LAST    +                                                                                    0  230
        +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
               run2S

HISTOGRAM OF VARIABLE     1 tsv1
                                   SYMBOL   COUNT      MEAN       ST.DEV.
                                     X       230     3032.091     311.557
                            EACH SYMBOL  REPRESENTS        1 OBSERVATIONS
INTERVAL                                                                              FREQUENCY
NAME            5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*2100.00 +                                                                                  0    0
*2200.00 +X                                                                                 1    1
*2300.00 +X                                                                                 1    2
*2400.00 +XXXXX                                                                             5    7
*2500.00 +XXXXXX                                                                            6   13
*2600.00 +XXXXXXXX                                                                          8   21
*2700.00 +XXXXXXXXXXXXXX                                                                   14   35
*2800.00 +XXXXXXXXXXXXX                                                                    13   48
*2900.00 +XXXXXXXXXXXXXXXXXXXXXXXXXX                                                       26   74
*3000.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                 32  106
*3100.00 +XXXXXXXXXXXXXXXXXXXXXXXXX                                                        25  131
*3200.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                    29  160
*3300.00 +XXXXXXXXXXXXXXXXXXXXXXXXX                                                        25  185
*3400.00 +XXXXXXXXXXXXXXXXXX                                                               18  203
*3500.00 +XXXXXXXXXXXXXX                                                                   14  217
*3600.00 +XXXXXX                                                                            6  223
*3700.00 +XXXXX                                                                             5  228
*3800.00 +X                                                                                 1  229
*3900.00 +                                                                                  0  229
*4000.00 +X                                                                                 1  230
*4100.00 +                                                                                  0  230
*LAST    +                                                                                  0  230
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
         run29

HISTOGRAM OF VARIABLE     2 tsvn
                                   SYMBOL   COUNT      MEAN      ST.DEV.
                                     X       230     3278.540    305.638
                          EACH SYMBOL REPRESENTS         1 OBSERVATIONS
INTERVAL                                                                                        FREQUENCY
NAME             5    10    15    20    25    30    35    40    45    50    55    60    65    70    75    80  INT. CUM.
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*2300.00   +                                                                                      0    0
*2400.00   +X                                                                                     1    1
*2500.00   +X                                                                                     1    2
*2600.00   +X                                                                                     1    3
*2700.00   +XXXXXXX                                                                               7   10
*2800.00   +XXXXX                                                                                 5   15
*2900.00   +XXXXXXXXXXXXXX                                                                       14   29
*3000.00   +XXXXXXXXXXX                                                                          11   40
*3100.00   +XXXXXXXXXXXXXXXXXXXXXXXXX                                                            25   65
*3200.00   +XXXXXXXXXXXXXXXXXXXXXXXX                                                             24   89
*3300.00   +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                     32  121
*3400.00   +XXXXXXXXXXXXXXXXXXXXX                                                                21  142
*3500.00   +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                      31  173
*3600.00   +XXXXXXXXXXXXXXXXXXXXXXXXXXX                                                          27  200
*3700.00   +XXXXXXXXXXXX                                                                         12  212
*3800.00   +XXXXXXXXXX                                                                           10  222
*3900.00   +XXXXX                                                                                 5  227
*4000.00   +XX                                                                                    2  229
*4100.00   +                                                                                      0  229
*4200.00   +X                                                                                     1  230
*4300.00   +                                                                                      0  230
*LAST      +                                                                                      0  230
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                 5    10    15    20    25    30    35    40    45    50    55    60    65    70    75    80
```

```
             run29

HISTOGRAM OF VARIABLE     3 tsvh
                                 SYMBOL   COUNT      MEAN      ST.DEV.
                                   X       230     3501.748     299.315
                          EACH SYMBOL REPRESENTS        1 OBSERVATIONS
INTERVAL                                                                             FREQUENCY
NAME            5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*2600.00 +X                                                                                 1    1
*2700.00 +                                                                                  0    1
*2800.00 +X                                                                                 1    2
*2900.00 +XXXXXX                                                                            6    8
*3000.00 +XXXXXX                                                                            6   14
*3100.00 +XXXXXXX                                                                           7   21
*3200.00 +XXXXXXXXXXXXXXXX                                                                 16   37
*3300.00 +XXXXXXXXXXXXXXXXX                                                                17   54
*3400.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXX                                                      27   81
*3500.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                            37  118
*3600.00 +XXXXXXXXXXXXXXXXXXXXX                                                            21  139
*3700.00 +XXXXXXXXXXXXXXXXXXXXXXXXXX                                                       26  165
*3800.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                               34  199
*3900.00 +XXXXXXXXX                                                                         9  208
*4000.00 +XXXXXXXXXXXXXX                                                                   14  222
*4100.00 +XXXXX                                                                             5  227
*4200.00 +XX                                                                                2  229
*4300.00 +                                                                                  0  229
*4400.00 +X                                                                                 1  230
*4500.00 +                                                                                  0  230
*4600.00 +                                                                                  0  230
*LAST    +                                                                                  0  230
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
run30

HISTOGRAM OF VARIABLE    1 tsv1
                                  SYMBOL  COUNT      MEAN      ST.DEV.
                                    X      230     2107.692     372.141
                         EACH SYMBOL REPRESENTS          1 OBSERVATIONS
INTERVAL                                                                                   FREQUENCY
NAME          5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*600.000  +                                                                                   0    0
*750.000  +                                                                                   0    0
*900.000  +                                                                                   0    0
*1050.00  +X                                                                                  1    1
*1200.00  +XX                                                                                 2    3
*1350.00  +XXXX                                                                               4    7
*1500.00  +XXXX                                                                               4   11
*1650.00  +XXXXXXXXXXXXX                                                                     13   24
*1800.00  +XXXXXXXXXXXXXXXXXXXXXXXXX                                                         25   49
*1950.00  +XXXXXXXXXXXXXXXXXXXXXXXXX                                                         25   74
*2100.00  +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                              36  110
*2250.00  +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                          40  150
*2400.00  +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                  32  182
*2550.00  +XXXXXXXXXXXXXXXXXXXXXXXX                                                          24  206
*2700.00  +XXXXXXX                                                                            7  213
*2850.00  +XXXXXXXXXXXXX                                                                     13  226
*3000.00  +XX                                                                                 2  228
*3150.00  +X                                                                                  1  229
*3300.00  +X                                                                                  1  230
*3450.00  +                                                                                   0  230
*3600.00  +                                                                                   0  230
*LAST     +                                                                                   0  230
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
            run30

HISTOGRAM OF VARIABLE     2 tsvn
                                   SYMBOL   COUNT       MEAN      ST.DEV.
                                     X       230     2341.948      373.011
                            EACH SYMBOL REPRESENTS            1 OBSERVATIONS
INTERVAL
NAME             5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80     FREQUENCY
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+    INT. CUM.
*750.000   +                                                                                      0    0
*900.000   +                                                                                      0    0
*1050.00   +                                                                                      0    0
*1200.00   +X                                                                                     1    1
*1350.00   +X                                                                                     1    2
*1500.00   +XX                                                                                    2    4
*1650.00   +XXXX                                                                                  4    8
*1800.00   +XXXXXXXX                                                                              8   16
*1950.00   +XXXXXXXXXXXXXXXXXX                                                                   18   34
*2100.00   +XXXXXXXXXXXXXXXXXXXXXX                                                               22   56
*2250.00   +XXXXXXXXXXXXXXXXXXXXXXXXXX                                                           26   82
*2400.00   +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                 52  134
*2550.00   +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                 36  170
*2700.00   +XXXXXXXXXXXXXXXXXXX                                                                  19  189
*2850.00   +XXXXXXXXXXXXXXXXXXXXXX                                                               22  211
*3000.00   +XXXXXXXXXXX                                                                          11  222
*3150.00   +XXXXX                                                                                 5  227
*3300.00   +X                                                                                     1  228
*3450.00   +XX                                                                                    2  230
*3600.00   +                                                                                      0  230
*3750.00   +                                                                                      0  230
*LAST      +                                                                                      0  230
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                 5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
run30

HISTOGRAM OF VARIABLE    3 tsvh
                                  SYMBOL  COUNT      MEAN      ST.DEV.
                                    X      230     2577.369    368.777
                             EACH SYMBOL REPRESENTS        1 OBSERVATIONS
INTERVAL                                                                                FREQUENCY
NAME          5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*900.000   +                                                                                  0    0
*1050.00   +                                                                                  0    0
*1200.00   +                                                                                  0    0
*1350.00   +                                                                                  0    0
*1500.00   +X                                                                                 1    1
*1650.00   +XX                                                                                2    3
*1800.00   +XX                                                                                2    5
*1950.00   +XXXXXX                                                                            6   11
*2100.00   +XXXXXXXXXXX                                                                      11   22
*2250.00   +XXXXXXXXXXXXXXXXXXXX                                                             20   42
*2400.00   +XXXXXXXXXXXXXXXXXXXXXXXXXX                                                       26   68
*2550.00   +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                              35  103
*2700.00   +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                      43  146
*2850.00   +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                   30  176
*3000.00   +XXXXXXXXXXXXXXXXXXXXXXXXXXX                                                      27  203
*3150.00   +XXXXXXXXXXX                                                                      11  214
*3300.00   +XXXXXXXXXXXX                                                                     12  226
*3450.00   +XX                                                                                2  228
*3600.00   +X                                                                                 1  229
*3750.00   +X                                                                                 1  230
*3900.00   +                                                                                  0  230
*LAST      +                                                                                  0  239
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
                run31

HISTOGRAM OF VARIABLE     1 tsv1
                                 SYMBOL  COUNT      MEAN      ST.DEV.
                                   X      230    4278.875    148.544
                        EACH SYMBOL REPRESENTS         1 OBSERVATIONS
INTERVAL                                                                                  FREQUENCY
NAME          5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*3650.00 +                                                                                  0    0
*3700.00 +                                                                                  0    0
*3750.00 +                                                                                  0    0
*3800.00 +X                                                                                 1    1
*3850.00 +                                                                                  0    1
*3900.00 +                                                                                  0    1
*3950.00 +X                                                                                 1    2
*4000.00 +XXXXX                                                                             5    7
*4050.00 +XXXXXXXXX                                                                         9   16
*4100.00 +XXXXXXXXXXXXX                                                                    13   29
*4150.00 +XXXXXXXXXXXXXXXXXXX                                                              19   48
*4200.00 +XXXXXXXXXXXXXXXXXXX                                                              19   67
*4250.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXX                                                      27   94
*4300.00 +XXXXXXXXXXXXXXXXXXXXXXXXXX                                                       26  120
*4350.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                   30  150
*4400.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                   30  180
*4450.00 +XXXXXXXXXXXXXXXXXXXXXXXXXX                                                       26  206
*4500.00 +XXXXXXXXX                                                                         9  215
*4550.00 +XXXXXXXX                                                                          8  223
*4600.00 +XXXX                                                                              4  227
*4650.00 +XXX                                                                               3  230
*LAST    +                                                                                  0  230
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
           run31

HISTOGRAM OF VARIABLE    2 tsvn
                                  SYMBOL   COUNT      MEAN      ST.DEV.
                                    X       23Ø     4499.586     129.Ø67
                        EACH SYMBOL REPRESENTS          1 OBSERVATIONS
INTERVAL                                                                             FREQUENCY
NAME            5    1Ø   15   2Ø   25   3Ø   35   4Ø   45   5Ø   55   6Ø   65   7Ø   75   8Ø  INT. CUM.
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*4ØØØ.ØØ  +                                                                                  Ø    Ø
*4Ø5Ø.ØØ  +                                                                                  Ø    Ø
*41ØØ.ØØ  +                                                                                  Ø    Ø
*415Ø.ØØ  +X                                                                                 1    1
*42ØØ.ØØ  +X                                                                                 1    2
*425Ø.ØØ  +XX                                                                                2    4
*43ØØ.ØØ  +XXXXXXXXXXXXXX                                                                   14   18
*435Ø.ØØ  +XXXXXXXXXXXXXXXX                                                                 16   34
*44ØØ.ØØ  +XXXXXXXXXXXXXXXXXXXXX                                                            21   55
*445Ø.ØØ  +XXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                     28   83
*45ØØ.ØØ  +XXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                    29  112
*455Ø.ØØ  +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                 32  144
*46ØØ.ØØ  +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                              35  179
*465Ø.ØØ  +XXXXXXXXXXXXXXXXXXXXXXXXXXX                                                      27  2Ø6
*47ØØ.ØØ  +XXXXXXXXXXXX                                                                     12  218
*475Ø.ØØ  +XXXXX                                                                             5  223
*48ØØ.ØØ  +XXXX                                                                              4  227
*485Ø.ØØ  +XXX                                                                               3  23Ø
*49ØØ.ØØ  +                                                                                  Ø  23Ø
*495Ø.ØØ  +                                                                                  Ø  23Ø
*5ØØØ.ØØ  +                                                                                  Ø  23Ø
*LAST     +                                                                                  Ø  23Ø
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                5    1Ø   15   2Ø   25   3Ø   35   4Ø   45   5Ø   55   6Ø   65   7Ø   75   8Ø
```

```
              run31

HISTOGRAM OF VARIABLE     3 tsvh
                                          SYMBOL   COUNT      MEAN      ST.DEV.
                                            X       230     4687.936    115.468
                                  EACH SYMBOL  REPRESENTS         1 OBSERVATIONS
INTERVAL                                                                                            FREQUENCY
NAME            5    10    15    20    25    30    35    40    45    50    55    60    65    70    75    80  INT. CUM.
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*4200.00   +                                                                                        0     0
*4250.00   +                                                                                        0     0
*4300.00   +                                                                                        0     0
*4350.00   +                                                                                        0     0
*4400.00   +X                                                                                       1     1
*4450.00   +XX                                                                                      2     3
*4500.00   +XXXXXXXXX                                                                               9    12
*4550.00   +XXXXXXXXXXXXXXXXXXXX                                                                   20    32
*4600.00   +XXXXXXXXXXXXXXXXXXXXX                                                                  21    53
*4650.00   +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                       32    85
*4700.00   +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                       32   117
*4750.00   +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                               40   157
*4800.00   +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                 38   195
*4850.00   +XXXXXXXXXXXXXXXXXX                                                                     18   213
*4900.00   +XXXXXXXXXX                                                                             10   223
*4950.00   +XXXX                                                                                    4   227
*5000.00   +XXX                                                                                     3   230
*5050.00   +                                                                                        0   230
*5100.00   +                                                                                        0   230
*5150.00   +                                                                                        0   230
*5200.00   +                                                                                        0   230
*LAST      +                                                                                        0   230
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                5    10    15    20    25    30    35    40    45    50    55    60    65    70    75    80
```

```
          run33

HISTOGRAM OF VARIABLE    1 tsv1
                                        SYMBOL  COUNT     MEAN     ST.DEV.
                                          X      230    2137.379    416.856
                                EACH SYMBOL REPRESENTS        1 OBSERVATIONS
INTERVAL                                                                         FREQUENCY
NAME           5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*600.000  +                                                                                   0    0
*750.000  +                                                                                   0    0
*900.000  +X                                                                                  1    1
*1050.00  +X                                                                                  1    2
*1200.00  +XX                                                                                 2    4
*1350.00  +XXX                                                                                3    7
*1500.00  +XXXXXXXXX                                                                          9   16
*1650.00  +XXXXXXXXXXX                                                                       11   27
*1800.00  +XXXXXXXXXXXXXXXXXXXXXXX                                                           23   50
*1950.00  +XXXXXXXXXXXXXXXXXX                                                                18   68
*2100.00  +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                               35  103
*2250.00  +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                         41  144
*2400.00  +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                    30  174
*2550.00  +XXXXXXXXXXXXXXXXX                                                                 17  191
*2700.00  +XXXXXXXXXXXXXXXXXXX                                                               19  210
*2850.00  +XXXXXXXXXXX                                                                       11  221
*3000.00  +XXXXXX                                                                             6  227
*3150.00  +X                                                                                  1  228
*3300.00  +X                                                                                  1  229
*3450.00  +X                                                                                  1  230
*3600.00  +                                                                                   0  230
*LAST     +                                                                                   0  230
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
               5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
run32

HISTOGRAM OF VARIABLE    2 tsvn
                                 SYMBOL   COUNT      MEAN      ST.DEV.
                                   X       230     3408.666     341.009
                        EACH SYMBOL REPRESENTS          1 OBSERVATIONS
INTERVAL                                                                                    FREQUENCY
NAME             5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
                 +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*2400.00 +X                                                                                  1     1
*2500.00 +                                                                                   0     1
*2600.00 +X                                                                                  1     2
*2700.00 +XXXX                                                                               4     6
*2800.00 +XXXXXX                                                                             6    12
*2900.00 +XXX                                                                                3    15
*3000.00 +XXXXXXXXXXXXXXX                                                                   15    30
*3100.00 +XXXXXXXXXXXX                                                                      12    42
*3200.00 +XXXXXXXXXXXXXXXXXXXXX                                                             21    63
*3300.00 +XXXXXXXXXXXXXXXXXXXX                                                              20    83
*3400.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                  32   115
*3500.00 +XXXXXXXXXXXXXXXXXXXX                                                              20   135
*3600.00 +XXXXXXXXXXXXXXXXXXXXXXXXXX                                                        26   161
*3700.00 +XXXXXXXXXXXXXXXXXXXX                                                              20   181
*3800.00 +XXXXXXXXXXXXXXXXXXXXXXXX                                                          24   205
*3900.00 +XXXXXXXXXX                                                                        10   215
*4000.00 +XXXXXXXX                                                                           8   223
*4100.00 +XXXX                                                                               4   227
*4200.00 +XX                                                                                 2   229
*4300.00 +                                                                                   0   229
*4400.00 +X                                                                                  1   230
*LAST    +                                                                                   0   230
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
                run32

HISTOGRAM OF VARIABLE     3 tsvh
                                          SYMBOL   COUNT       MEAN      ST.DEV.
                                            X       230     3504.652     336.385
                                 EACH SYMBOL REFRESENTS         1 OBSERVATIONS
INTERVAL                                                                                      FREQUENCY
NAME              5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80   INT. CUM.
                 +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*2600.00 +X                                                                                      1    1
*2700.00 +                                                                                       0    1
*2800.00 +X                                                                                      1    2
*2900.00 +XXX                                                                                    3    5
*3000.00 +XXXXXX                                                                                 6   11
*3100.00 +XXXXXX                                                                                 6   17
*3200.00 +XXXXXXXXXXXXX                                                                         13   30
*3300.00 +XXXXXXXXXXX                                                                           11   41
*3400.00 +XXXXXXXXXXXXXXXXXXX                                                                   19   60
*3500.00 +XXXXXXXXXXXXXXXXXXXXXXXX                                                              24   84
*3600.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                    34  118
*3700.00 +XXXXXXXXXXXXXXX                                                                       15  133
*3800.00 +XXXXXXXXXXXXXXXXXXXXXXXXXX                                                            26  159
*3900.00 +XXXXXXXXXXXXXXXXXXXXXXXXXX                                                            26  185
*4000.00 +XXXXXXXXXXXXXXXXXXX                                                                   19  204
*4100.00 +XXXXXXXXXXXXX                                                                         13  217
*4200.00 -XXXXXX                                                                                 6  223
*4300.00 +XXXXX                                                                                  5  228
*4400.00 +X                                                                                      1  229
*4500.00 +                                                                                       0  229
*4600.00 +X                                                                                      1  230
*LAST    +                                                                                       0  230
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
          5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
                run32

HISTOGRAM OF VARIABLE.   1 tsv1
                                    SYMBOL  COUNT     MEAN      ST.DEV.
                                      X      230    3195.590    346.060
                         EACH SYMBOL REPRESENTS         1 OBSERVATIONS
INTERVAL                                                                                   FREQUENCY
NAME             5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*2200.00  +X                                                                                  1    1
*2300.00  +X                                                                                  1    2
*2400.00  +                                                                                   0    2
*2500.00  +XXXXXX                                                                             6    8
*2600.00  +XXXXX                                                                              5   13
*2700.00  +XXXX                                                                               4   17
*2800.00  +XXXXXXXXXXXXX                                                                     13   30
*2900.00  +XXXXXXXXXXXXXX                                                                    14   44
*3000.00  +XXXXXXXXXXXXXXXXXXXXXX                                                            22   66
*3100.00  +XXXXXXXXXXXXXXXXXXXXXXX                                                           23   89
*3200.00  +XXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                      28  117
*3300.00  +XXXXXXXXXXXXXXXXXXXX                                                              20  137
*3400.00  +XXXXXXXXXXXXXXXXXXXXXXXXXX                                                        26  163
*3500.00  +XXXXXXXXXXXXXXXXXXXXXXX                                                           23  186
*3600.00  +XXXXXXXXXXXXXXXXXX                                                                18  204
*3700.00  +XXXXXXXXXX                                                                        10  214
*3800.00  +XXXXXXXXX                                                                          9  223
*3900.00  +XXX                                                                                3  226
*4000.00  +XXX                                                                                3  229
*4100.00  +                                                                                   0  229
*4200.00  +X                                                                                  1  230
*LAST     +                                                                                   0  230
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                 5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
                    run33

HISTOGRAM OF VARIABLE     2 tsvn
                                        SYMBOL   COUNT      MEAN      ST.DEV.
                                          X       230    2341.388     417.882
                               EACH SYMBOL REPRESENTS         1 OBSERVATIONS
INTERVAL                                                                                              FREQUENCY
NAME            5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80   INT. CUM.
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*750.000   +                                                                                       0    0
*900.000   +                                                                                       0    0
*1050.00   +                                                                                       0    0
*1200.00   +X                                                                                      1    1
*1350.00   +XXX                                                                                    3    4
*1500.00   +XX                                                                                     2    6
*1650.00   +XXXX                                                                                   4   10
*1800.00   +XXXXXXXXXXX                                                                           11   21
*1950.00   +XXXXXXXXXXXXXXXXXXXXX                                                                 21   42
*2100.00   +XXXXXXXXXXXXXXX                                                                       15   57
*2250.00   +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                      32   89
*2400.00   +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                             41  130
*2550.00   +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                   35  165
*2700.00   +XXXXXXXXXXXXXXXXXXX                                                                   19  184
*2850.00   +XXXXXXXXXXXXXXXXXXXXXXX                                                               23  207
*3000.00   +XXXXXX                                                                                 6  213
*3150.00   +XXXXXXXXXXXX                                                                          12  225
*3300.00   +XXX                                                                                    3  228
*3450.00   +X                                                                                      1  229
*3600.00   +X                                                                                      1  230
*3750.00   +                                                                                       0  230
*LAST      +                                                                                       0  230
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
              run33

HISTOGRAM OF VARIABLE    3 tsvh
                                          SYMBOL   COUNT      MEAN      ST.DEV.
                                            X       230    2546.448     415.053
                                 EACH SYMBOL REPRESENTS        1 OBSERVATIONS
INTERVAL                                                                                  FREQUENCY
NAME            5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*900.000  +                                                                                  0    0
*1050.00  +                                                                                  0    0
*1200.00  +                                                                                  0    0
*1350.00  +X                                                                                 1    1
*1500.00  +X                                                                                 1    2
*1650.00  +XX                                                                                2    4
*1800.00  +XXXX                                                                              4    8
*1950.00  +XXXXXXXXX                                                                         9   17
*2100.00  +XXXXXXXXXXXXXXXXX                                                                17   34
*2250.00  +XXXXXXXXXXXXXXXXXX                                                               18   52
*2400.00  +XXXXXXXXXXXXXXXXXXXXXXXXX                                                        25   77
*2550.00  +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                           38  115
*2700.00  +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                               34  149
*2850.00  +XXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                     28  177
*3000.00  +XXXXXXXXXXXXXXXXXXXXXXXX                                                         24  201
*3150.00  +XXXXXXXXXXX                                                                      11  212
*3300.00  +XXXXXXXXXXX                                                                      11  223
*3450.00  +XXXX                                                                              4  227
*3600.00  +XX                                                                                2  229
*3750.00  +X                                                                                 1  230
*3900.00  +                                                                                  0  230
*LAST     +                                                                                  0  230
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
                run34

HISTOGRAM OF VARIABLE     1 tsvl
                                     SYMBOL   COUNT      MEAN      ST.DEV.
                                       X       230     4499.520    154.059
                          EACH SYMBOL REPRESENTS          1 OBSERVATIONS
INTERVAL                                                                                     FREQUENCY
NAME           5   10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*3950.00  +                                                                                  0    0
*4000.00  +X                                                                                 1    1
*4050.00  +                                                                                  0    1
*4100.00  +                                                                                  0    1
*4150.00  +X                                                                                 1    2
*4200.00  +XX                                                                                2    4
*4250.00  +XXXXXXXX                                                                          8   12
*4300.00  +XXXXXXXXXXXXXX                                                                   14   26
*4350.00  +XXXXXXXXXXXXXX                                                                   14   40
*4400.00  +XXXXXXXXXXXXXXXXXXXXXXXX                                                         24   64
*4450.00  +XXXXXXXXXXXXXXXXXXXXXXX                                                          23   87
*4500.00  +XXXXXXXXXXXXXXXXXXXXX                                                            21  108
*4550.00  +XXXXXXXXXXXXXXXXXXXXXXXXXX                                                       26  134
*4600.00  +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                33  167
*4650.00  +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                   30  197
*4700.00  +XXXXXXXXXXXXXX                                                                   14  211
*4750.00  +XXXXXXXXXX                                                                       10  221
*4800.00  +XXXX                                                                              4  225
*4850.00  +XXXX                                                                              4  229
*4900.00  +X                                                                                 1  230
*4950.00  +                                                                                  0  230
*LAST     +                                                                                  0  230
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
               5   10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
          run34

HISTOGRAM OF VARIABLE    2 tsvn
                                   SYMBOL  COUNT      MEAN      ST.DEV.
                                     X      230     4700.594     135.241
                              EACH SYMBOL REPRESENTS        1 OBSERVATIONS
INTERVAL                                                                                  FREQUENCY
NAME             5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
                 +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*4200.00 +                                                                                         0    0
*4250.00 +                                                                                         0    0
*4300.00 +X                                                                                        1    1
*4350.00 +                                                                                         0    1
*4400.00 +X                                                                                        1    2
*4450.00 +XXXXX                                                                                    5    7
*4500.00 +XXXXXXXXXXX                                                                             11   18
*4550.00 +XXXXXXXXXXXXXXXXX                                                                       17   35
*4600.00 +XXXXXXXXXXXXXXXXXXXXXX                                                                  22   57
*4650.00 +XXXXXXXXXXXXXXXXXXXXXXXXX                                                               25   82
*4700.00 +XXXXXXXXXXXXXXXXXXXXXXXXXX                                                              26  108
*4750.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                        32  140
*4800.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX-                                                   36  176
*4850.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXX                                                             27  203
*4900.00 +XXXXXXXXXXXXXX                                                                          14  217
*4950.00 +XXXXXX                                                                                   6  223
*5000.00 +XXXXX                                                                                    5  228
*5050.00 +XX                                                                                       2  230
*5100.00 +                                                                                         0  230
*5150.00 +                                                                                         0  230
*5200.00 +                                                                                         0  230
*LAST    +                                                                                         0  230
                 +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                 5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
run34

HISTOGRAM OF VARIABLE     3 tsvh
                              SYMBOL  COUNT      MEAN      ST.DEV.
                                 X      230    4874.298     122.170
                        EACH SYMBOL REPRESENTS          1 OBSERVATIONS
INTERVAL                                                                                FREQUENCY
NAME            5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*4300.00 +                                                                                     0    0
*4350.00 +                                                                                     0    0
*4400.00 +                                                                                     0    0
*4450.00 +                                                                                     0    0
*4500.00 +                                                                                     0    0
*4550.00 +X                                                                                    1    1
*4600.00 +X                                                                                    1    2
*4650.00 +XXXXXXX                                                                              7    9
*4700.00 +XXXXXXXXXXXXXX                                                                      14   23
*4750.00 +XXXXXXXXXXXXXXXXX                                                                   17   40
*4800.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXX                                                         27   67
*4850.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                        28   95
*4900.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                        28  123
*4950.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                        44  167
*5000.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                    32  199
*5050.00 +XXXXXXXXXXXXXXX                                                                     15  214
*5100.00 +XXXXXXXXX                                                                            9  223
*5150.00 +XXXXXX                                                                               6  229
*5200.00 +X                                                                                    1  230
*5250.00 +                                                                                     0  230
*5300.00 +                                                                                     0  230
*LAST    +                                                                                     0  230
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
          run35

HISTOGRAM OF VARIABLE     1 tsvl
                                        SYMBOL   COUNT      MEAN      ST.DEV.
                                          X       230     3314.050     374.746
                               EACH SYMBOL REPRESENTS        1 OBSERVATIONS
INTERVAL                                                                                       FREQUENCY
NAME          5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*2400.00 +XX                                                                                  2    2
*2500.00 +X                                                                                   1    3
*2600.00 +XXXXXXXX                                                                            8   11
*2700.00 +XX                                                                                  2   13
*2800.00 +XXXXXXX                                                                             7   20
*2900.00 +XXXXXXXXXXX                                                                        11   31
*3000.00 +XXXXXXXXXXXXXXX                                                                    15   46
*3100.00 +XXXXXXXXXXXXXXXXXXX                                                                19   65
*3200.00 +XXXXXXXXXXXXXXXXXXXX                                                               20   85
*3300.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                      29  114
*3400.00 +XXXXXXXXXXXXXXX                                                                    15  129
*3500.00 +XXXXXXXXXXXXXXXXXXXXXXXX                                                           24  153
*3600.00 +XXXXXXXXXXXXXXXXXXXXXX                                                             22  175
*3700.00 +XXXXXXXXXXXXXXXXXXXXX                                                              21  196
*3800.00 +XXXXXXXXXXXXXX                                                                     14  210
*3900.00 +XXXXXXXX                                                                            8  218
*4000.00 +XXXXXX                                                                              6  224
*4100.00 +XXXX                                                                                4  228
*4200.00 +X                                                                                   1  229
*4300.00 +X                                                                                   1  230
*4400.00 +                                                                                    0  230
*LAST    +                                                                                    0  230
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
run35

HISTOGRAM OF VARIABLE    2 tsvn
                              SYMBOL   COUNT      MEAN      ST.DEV.
                                X       230     3508.505     370.232
                         EACH SYMBOL REPRESENTS        1 OBSERVATIONS
INTERVAL                                                                                FREQUENCY
NAME           5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*2600.00 +XX                                                                                 2    2
*2700.00 +X                                                                                  1    3
*2800.00 +XXXXXXX                                                                            7   10
*2900.00 +XXXX                                                                               4   14
*3000.00 +XXXXXX                                                                             6   20
*3100.00 +XXXXXXXXXXXX                                                                      12   32
*3200.00 +XXXXXXXXXXXXX                                                                     13   45
*3300.00 +XXXXXXXXXXXXXXXXXXXXX                                                             21   66
*3400.00 +XXXXXXXXXXXXXXXXXXX                                                               19   85
*3500.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                    30  115
*3600.00 +XXXXXXXXXXXXXXXXXXX                                                               19  134
*3700.00 +XXXXXXXXXXXXXXXXXXXX                                                              20  154
*3800.00 +XXXXXXXXXXXXXXXXXXXXXXX                                                           23  177
*3900.00 +XXXXXXXXXXXXXXXXXXXXX                                                             21  198
*4000.00 +XXXXXXXXXXXX                                                                      12  210
*4100.00 +XXXXXXXXX                                                                          9  219
*4200.00 +XXXXXX                                                                             6  225
*4300.00 +XXXX                                                                               4  229
*4400.00 +                                                                                   0  229
*4500.00 +X                                                                                  1  230
*4600.00 +                                                                                   0  230
*LAST    +                                                                                   0  230
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
               5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
          run35

HISTOGRAM OF VARIABLE     3 tsvh
                                      SYMBOL   COUNT       MEAN      ST.DEV.
                                        X        230     3688.930     366.305
                              EACH SYMBOL REPRESENTS          1 OBSERVATIONS
INTERVAL                                                                                      FREQUENCY
NAME               5    10    15    20    25    30    35    40    45    50    55    60    65    70    75    80   INT. CUM.
               +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*2800.00 +XX                                                                                     2     2
*2900.00 +X                                                                                      1     3
*3000.00 +XXXXXXXX                                                                               8    11
*3100.00 +XXX                                                                                    3    14
*3200.00 +XXXXXXXX                                                                               8    22
*3300.00 +XXXXXXXXXX                                                                            10    32
*3400.00 +XXXXXXXXXXXXXX                                                                        14    46
*3500.00 +XXXXXXXXXXXXXXXXXXXXXXXX                                                              24    70
*3600.00 +XXXXXXXXXXXXXXXXXXXXXX                                                                22    92
*3700.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXX                                                           27   119
*3800.00 +XXXXXXXXXXXXXXX                                                                       15   134
*3900.00 +XXXXXXXXXXXXXXXXXXXXXXXX                                                              24   158
*4000.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                         29   187
*4100.00 +XXXXXXXXXXXXXXXXX                                                                     17   204
*4200.00 +XXXXXXXX                                                                               8   212
*4300.00 +XXXXXXXXXX                                                                            10   222
*4400.00 +XXX                                                                                    3   225
*4500.00 +XXXX                                                                                   4   229
*4600.00 +                                                                                       0   229
*4700.00 +X                                                                                      1   230
*4800.00 +                                                                                       0   230
*LAST    +                                                                                       0   230
               +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                   5    10    15    20    25    30    35    40    45    50    55    60    65    70    75    80
```

```
        run36

HISTOGRAM OF VARIABLE    1 tsv1
                               SYMBOL  COUNT     MEAN     ST.DEV.
                                 X      230    2154.222    453.632
                          EACH SYMBOL REPRESENTS        1 OBSERVATIONS
INTERVAL                                                                                  FREQUENCY
NAME           5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80  INT. CUM.
        +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*600.000 +                                                                                   0    0
*750.000 +                                                                                   0    0
*900.000 +X                                                                                  1    1
*1050.00 +XXX                                                                                3    4
*1200.00 +X                                                                                  1    5
*1350.00 +XXX                                                                                3    8
*1500.00 +XXXXXXXXXX                                                                        10   18
*1650.00 +XXXXXXXXXXX                                                                       11   29
*1800.00 +XXXXXXXXXXXXXXXXXXXXX                                                             21   50
*1950.00 +XXXXXXXXXXXXXXXXX                                                                 17   67
*2100.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                  32   99
*2250.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                        42  141
*2400.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                      28  169
*2550.00 +XXXXXXXXXXXXXXXXXX                                                                18  187
*2700.00 +XXXXXXXXXXXXXXXXXXX                                                               19  206
*2850.00 +XXXXXXX                                                                            7  213
*3000.00 +XXXXXXXXXXX                                                                       11  224
*3150.00 +XXXX                                                                               4  228
*3300.00 +X                                                                                  1  229
*3450.00 +                                                                                   0  229
*3600.00 +X                                                                                  1  230
*LAST    +                                                                                   0  230
        +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
               5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
                    run36

HISTOGRAM OF VARIABLE      2 tsvn
                                       SYMBOL  COUNT      MEAN      ST.DEV.
                                         X      230    2341.339     454.796
                         EACH SYMBOL REPRESENTS          1 OBSERVATIONS
INTERVAL                                                                                    FREQUENCY
NAME             5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80   INT. CUM.
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*750.000   +                                                                                   0    0
*900.000   +                                                                                   0    0
*1050.00   +X                                                                                  1    1
*1200.00   +X                                                                                  1    2
*1350.00   +XX                                                                                 2    4
*1500.00   +XXX                                                                                3    7
*1650.00   +XXXXXXXXXX                                                                        10   17
*1800.00   +XXXXXXXXXX                                                                        10   27
*1950.00   +XXXXXXXXXXXXXXXXXXXXX                                                             21   48
*2100.00   +XXXXXXXXXXXXX                                                                     13   61
*2250.00   +XXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                     29   90
*2400.00   +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                           39  129
*2550.00   +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                    30  159
*2700.00   +XXXXXXXXXXXXXXXXXXXX                                                              20  179
*2850.00   +XXXXXXXXXXXXXXXXXXXXXXXX                                                          24  203
*3000.00   +XXXXXXXX                                                                           8  211
*3150.00   +XXXXXXXXXXXX                                                                      12  223
*3300.00   +XXXX                                                                               4  227
*3450.00   +XX                                                                                 2  229
*3600.00   +                                                                                   0  229
*3750.00   +X                                                                                  1  230
*LAST      +                                                                                   0  230
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                 5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
            run36

HISTOGRAM OF VARIABLE     3 tsvh
                                   SYMBOL   COUNT      MEAN     ST.DEV.
                                     X       230     2528.987    452.489
                          EACH SYMBOL REPRESENTS          1 OBSERVATIONS
INTERVAL
NAME           5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80   FREQUENCY
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+   INT. CUM.
*900.000 +                                                                                      0    0
*1050.00 +                                                                                      0    0
*1200.00 +X                                                                                     1    1
*1350.00 +X                                                                                     1    2
*1500.00 +XX                                                                                    2    4
*1650.00 +XXX                                                                                   3    7
*1800.00 +XXXXX                                                                                 5   12
*1950.00 +XXXXXXXXXX                                                                           10   22
*2100.00 +XXXXXXXXXXXXXXXXXX                                                                   18   40
*2250.00 +XXXXXXXXXXXXXXXXX                                                                    17   57
*2400.00 +XXXXXXXXXXXXXXXXXXXXXXXXX                                                            25   82
*2550.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                 36  118
*2700.00 +XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX                                                    33  151
*2850.00 +XXXXXXXXXXXXXXXXXXXXXXXXXX                                                           26  177
*3000.00 +XXXXXXXXXXXXXXXXXX                                                                   18  195
*3150.00 +XXXXXXXXXXXXXXXX                                                                     16  211
*3300.00 +XXXXXXXXX                                                                             9  220
*3450.00 +XXXXXX                                                                                6  226
*3600.00 +XX                                                                                    2  228
*3750.00 +X                                                                                     1  229
*3900.00 +X                                                                                     1  230
*LAST    +                                                                                      0  230
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
               5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
```

```
          run37

HISTOGRAM OF VARIABLE     1 tsvl
                                  SYMBOL   COUNT      MEAN       ST.DEV.
                                    X       400     7513.065     220.216
                             EACH SYMBOL REPRESENTS        3 OBSERVATIONS
INTERVAL                                                                                FREQUENCY
NAME          15   30   45   60   75   90   105  120  135  150  165  180  195  210  225  240   INT. CUM.
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*6850.00 +                                                                                  0    0
*6900.00 +                                                                                  1    1
*6950.00 +                                                                                  0    1
*7000.00 +                                                                                  0    1
*7050.00 +X                                                                                 4    5
*7100.00 +XXX                                                                               9   14
*7150.00 +XXX                                                                               9   23
*7200.00 +XXX                                                                              10   33
*7250.00 +XXXX                                                                             11   44
*7300.00 +XXXXXXX                                                                          22   66
*7350.00 +XXXXXXXXX                                                                        27   93
*7400.00 +XXXXXXXXXXXX                                                                     37  130
*7450.00 +XXXXXXXX                                                                         25  155
*7500.00 +XXXXXXXXXXXX                                                                     36  191
*7550.00 +XXXXXXXXXXX                                                                      33  224
*7600.00 +XXXXXXXXXXXX                                                                     35  259
*7650.00 +XXXXXXXXXXX                                                                      33  292
*7700.00 +XXXXXXXXX                                                                        28  320
*7750.00 +XXXXXXXX                                                                         24  344
*7800.00 +XXXXX                                                                            14  358
*7850.00 +XXXXX                                                                            14  372
*7900.00 +XXXXX                                                                            16  388
*7950.00 +X                                                                                 4  392
*8000.00 +X                                                                                 2  394
*8050.00 +                                                                                  1  395
*8100.00 +X                                                                                 4  399
*8150.00 +                                                                                  0  399
*8200.00 +                                                                                  1  400
*LAST    +                                                                                  0  400
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              15   30   45   60   75   90   105  120  135  150  165  180  195  210  225  240
```

```
          run37

HISTOGRAM OF VARIABLE     2 tsvn
                                 SYMBOL  COUNT      MEAN      ST.DEV.
                                   X      400     8552.046     175.749
                        EACH SYMBOL REPRESENTS         3 OBSERVATIONS
INTERVAL                                                                                FREQUENCY
NAME           15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240  INT. CUM.
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*7950.00 +                                                                                  0    0
*8000.00 +                                                                                  1    1
*8050.00 +                                                                                  0    1
*8100.00 +                                                                                  0    1
*8150.00 +X                                                                                 2    3
*8200.00 +XXX                                                                               8   11
*8250.00 +XXX                                                                               9   20
*8300.00 +XXX                                                                               9   29
*8350.00 +XXXXX                                                                            14   43
*8400.00 +XXXXXXXXXXXX                                                                     37   80
*8450.00 +XXXXXXXXXXXX                                                                     35  115
*8500.00 +XXXXXXXXXXXXX                                                                    39  154
*8550.00 +XXXXXXXXXXXXX                                                                    40  194
*8600.00 +XXXXXXXXXXXXXXXXX                                                                50  244
*8650.00 +XXXXXXXXXXXXXX                                                                   42  286
*8700.00 +XXXXXXXXXXX                                                                      32  318
*8750.00 +XXXXXXXXXX                                                                       30  348
*8800.00 +XXXXXX                                                                           19  367
*8850.00 +XXXXXX                                                                           17  384
*8900.00 +XXX                                                                               9  393
*8950.00 +X                                                                                 2  395
*9000.00 +X                                                                                 2  397
*9050.00 +X                                                                                 2  399
*9100.00 +                                                                                  1  400
*LAST    +                                                                                  0  400
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
               15   30   45   50   75   90  105  120  135  150  165  180  195  210  225  240
```

```
              run37

HISTOGRAM OF VARIABLE     3 tsvh
                                    SYMBOL   COUNT       MEAN      ST.DEV.
                                      X       400     9376.144      139.917
                              EACH SYMBOL REPRESENTS          3 OBSERVATIONS
INTERVAL                                                                                                FREQUENCY
NAME          15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240   INT. CUM.
            +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*8900.00 +                                                                                      0    0
*8950.00 +                                                                                      1    1
*9000.00 +                                                                                      0    1
*9050.00 +                                                                                      1    2
*9100.00 +XX                                                                                    6    8
*9150.00 +XXXX                                                                                 13   21
*9200.00 +XXXXXX                                                                               19   40
*9250.00 +XXXXXXXXXXXXX                                                                        38   78
*9300.00 +XXXXXXXXXXXXXXXX                                                                     48  126
*9350.00 +XXXXXXXXXXXXXXXX                                                                     48  174
*9400.00 +XXXXXXXXXXXXXXXXX                                                                    51  225
*9450.00 +XXXXXXXXXXXXXXXXXXXX                                                                 61  286
*9500.00 +XXXXXXXXXXXXX                                                                        38  324
*9550.00 +XXXXXXXXXXX                                                                          33  357
*9600.00 +XXXXXXX                                                                              20  377
*9650.00 +XXXXX                                                                                16  393
*9700.00 +X                                                                                     2  395
*9750.00 +X                                                                                     2  397
*9800.00 +X                                                                                     3  400
*LAST    +                                                                                      0  400
            +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240
```

```
                run38

HISTOGRAM OF VARIABLE     1 tsvl
                                     SYMBOL  COUNT      MEAN      ST.DEV.
                                       X      400     5698.023    426.723
                           EACH SYMBOL REPRESENTS          3 OBSERVATIONS
INTERVAL                                                                                         FREQUENCY
NAME          15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240    INT. CUM.
             +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*4300.00 +                                                                                        0    0
*4400.00 +                                                                                        1    1
*4500.00 +                                                                                        0    1
*4600.00 +X                                                                                       3    4
*4700.00 +X                                                                                       2    6
*4800.00 +XXX                                                                                     9   15
*4900.00 +XXX                                                                                     8   23
*5000.00 +XXXXX                                                                                  14   37
*5100.00 +XXX                                                                                     9   46
*5200.00 +XXXXXXX                                                                                22   68
*5300.00 +XXXXXXXXXXXX                                                                           37  105
*5400.00 +XXXXXXX                                                                                22  127
*5500.00 +XXXXXXXXXXXXX                                                                          38  165
*5600.00 +XXXXXXXXXX                                                                             31  196
*5700.00 +XXXXXXXXXXX                                                                            32  228
*5800.00 +XXXXXXXXXX                                                                             29  257
*5900.00 +XXXXXXXXXXXXX                                                                          39  296
*6000.00 +XXXXXXXXX                                                                              28  324
*6100.00 +XXXXXXXXXX                                                                             31  355
*6200.00 +XXXXXX                                                                                 19  374
*6300.00 +XXXX                                                                                   11  385
*6400.00 +X                                                                                       4  389
*6500.00 +XX                                                                                      7  396
*6600.00 +X                                                                                       2  398
*6700.00 +                                                                                        1  399
*6800.00 +                                                                                        0  399
*6900.00 +                                                                                        0  399
*7000.00 +                                                                                        1  400
*LAST    +                                                                                        0  400
             +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240
```

```
                run38

HISTOGRAM OF VARIABLE     2 tsvn
                                  SYMBOL   COUNT      MEAN      ST.DEV.
                                    X       400     6594.195     419.579
                         EACH SYMBOL REPRESENTS         3 OBSERVATIONS
INTERVAL                                                                                      FREQUENCY
NAME           15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240   INT. CUM.
              +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*5300.00      +                                                                                 0    0
*5400.00      +                                                                                 1    1
*5500.00      +                                                                                 1    2
*5600.00      +                                                                                 1    3
*5700.00      +XX                                                                               5    8
*5800.00      +XXX                                                                              8   16
*5900.00      +XXX                                                                              9   25
*6000.00      +XXXXX                                                                           14   39
*6100.00      +XXX                                                                              8   47
*6200.00      +XXXXXXX                                                                         22   69
*6300.00      +XXXXXXXXXX                                                                      30   99
*6400.00      +XXXXXXXXX                                                                       28  127
*6500.00      +XXXXXXXXXXX                                                                     34  161
*6600.00      +XXXXXXXXXXXXXX                                                                  41  202
*6700.00      +XXXXXXXXXXX                                                                     32  234
*6800.00      +XXXXXXXXXX                                                                      30  264
*6900.00      +XXXXXXXXXXXX                                                                    36  300
*7000.00      +XXXXXXXXXX                                                                      29  329
*7100.00      +XXXXXXXX                                                                        25  354
*7200.00      +XXXXXXXXX                                                                       26  380
*7300.00      +XXX                                                                              8  388
*7400.00      +XX                                                                               5  393
*7500.00      +X                                                                                4  397
*7600.00      +                                                                                 1  398
*7700.00      +                                                                                 1  399
*7800.00      +                                                                                 0  399
*7900.00      +                                                                                 0  399
*8000.00      +                                                                                 1  400
*LAST         +                                                                                 0  400
              +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
               15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240
```

```
              run38

HISTOGRAM OF VARIABLE     3 tsvh
                                        SYMBOL   COUNT      MEAN     ST.DEV.
                                          X       400    7471.038    408.602
                              EACH SYMBOL REPRESENTS        3 OBSERVATIONS
INTERVAL                                                                              FREQUENCY
NAME         15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240   INT. CUM.
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*6200.00  +                                                                                  0    0
*6300.00  +                                                                                  1    1
*6400.00  +                                                                                  0    1
*6500.00  +X                                                                                 2    3
*6600.00  +X                                                                                 4    7
*6700.00  +XXX                                                                               9   16
*6800.00  +XXX                                                                               8   24
*6900.00  +XXXX                                                                             13   37
*7000.00  +XXXXX                                                                            15   52
*7100.00  +XXXXXX                                                                           19   71
*7200.00  +XXXXXXXXXXXXX                                                                    38  109
*7300.00  +XXXXXXX                                                                          21  130
*7400.00  +XXXXXXXXXXXX                                                                     35  165
*7500.00  +XXXXXXXXXXXXXXX                                                                  45  210
*7600.00  +XXXXXXXXXX                                                                       30  240
*7700.00  +XXXXXXXXXX                                                                       30  270
*7800.00  +XXXXXXXXXXXXX                                                                    38  308
*7900.00  +XXXXXXXXXXX                                                                      34  342
*8000.00  +XXXXXXXX                                                                         24  366
*8100.00  +XXXXX                                                                            16  382
*8200.00  +XXX                                                                               8  390
*8300.00  +XX                                                                                7  397
*8400.00  +                                                                                  0  397
*8500.00  +X                                                                                 2  399
*8600.00  +                                                                                  0  399
*8700.00  +                                                                                  0  399
*8800.00  +                                                                                  1  400
*LAST     +                                                                                  0  400
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
             15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240
```

```
            run39

HISTOGRAM OF VARIABLE     1 tsv1
                                      SYMBOL   COUNT      MEAN       ST.DEV.
                                        X       400     3695.127     472.166
                               EACH SYMBOL REPRESENTS          3 OBSERVATIONS
INTERVAL                                                                                              FREQUENCY
NAME          15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240   INT. CUM.
             +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*2250.00 +                                                                                    0    0
*2400.00 +                                                                                    1    1
*2550.00 +                                                                                    1    2
*2700.00 +X                                                                                   3    5
*2850.00 +XXXX                                                                               12   17
*3000.00 +XX                                                                                  7   24
*3150.00 +XXXXXXXXX                                                                          27   51
*3300.00 +XXXXXXXX                                                                           24   75
*3450.00 +XXXXXXXXXXXXXXXX                                                                   47  122
*3600.00 +XXXXXXXXXXXXXXXXX                                                                  50  172
*3750.00 +XXXXXXXXXXXXXXXXX                                                                  52  224
*3900.00 +XXXXXXXXXXXXXXXX                                                                   49  273
*4050.00 +XXXXXXXXXXXX                                                                       36  309
*4200.00 +XXXXXXXXX                                                                          26  335
*4350.00 +XXXXXXXXX                                                                          27  362
*4500.00 +XXXXXX                                                                             17  379
*4650.00 +XXXX                                                                               11  390
*4800.00 +XX                                                                                  6  396
*4950.00 +X                                                                                   3  399
*5100.00 +                                                                                    1  400
*LAST    +                                                                                    0  400
             +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240
```

```
                 run39

HISTOGRAM OF VARIABLE    2 tsvn
                                 SYMBOL  COUNT     MEAN     ST.DEV.
                                   X      400    4626.755    478.404
                            EACH SYMBOL REPRESENTS       3 OBSERVATIONS
INTERVAL                                                                                FREQUENCY
NAME         15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240  INT. CUM.
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*3150.00 +                                                                                 0    0
*3300.00 +                                                                                 1    1
*3450.00 +X                                                                                2    3
*3600.00 +X                                                                                3    6
*3750.00 +XX                                                                               6   12
*3900.00 +XXXX                                                                            12   24
*4050.00 +XXXXXXX                                                                         22   46
*4200.00 +XXXXXXXX                                                                        24   70
*4350.00 +XXXXXXXXXXXXXXXXX                                                               50  120
*4500.00 +XXXXXXXXXXXXXX                                                                  43  163
*4650.00 +XXXXXXXXXXXXXXXX                                                                48  211
*4800.00 +XXXXXXXXXXXXXXXXX                                                               51  262
*4950.00 +XXXXXXXXXXXX                                                                    37  299
*5100.00 +XXXXXXXXXXXXX                                                                   38  337
*5250.00 +XXXXXXX                                                                         20  357
*5400.00 +XXXXXX                                                                          17  374
*5550.00 +XXXXX                                                                           15  389
*5700.00 +XX                                                                               7  396
*5850.00 +X                                                                                3  399
*6000.00 +                                                                                 1  400
*LAST    +                                                                                 0  400
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
             15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240
```

```
               run39

HISTOGRAM OF VARIABLE    3 tsvh
                                   SYMBOL  COUNT      MEAN      ST.DEV.
                                     X      400     5558.158     470.905
                             EACH SYMBOL REPRESENTS        3 OBSERVATIONS
INTERVAL
NAME           15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240   FREQUENCY
            +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+  INT. CUM.
*4050.00 +                                                                                        0    0
*4200.00 +                                                                                        1    1
*4350.00 +X                                                                                       2    3
*4500.00 +X                                                                                       2    5
*4650.00 +XX                                                                                      6   11
*4800.00 +XXX                                                                                     8   19
*4950.00 +XXXXXXX                                                                                20   39
*5100.00 +XXXXXXXX                                                                               24   63
*5250.00 +XXXXXXXXXXXXXXX                                                                        46  109
*5400.00 +XXXXXXXXXXXXXXXX                                                                       47  156
*5550.00 +XXXXXXXXXXXXX                                                                          39  195
*5700.00 +XXXXXXXXXXXXXXXXXX                                                                     55  250
*5850.00 +XXXXXXXXXXXXXX                                                                         42  292
*6000.00 +XXXXXXXXXXXXXX                                                                         41  333
*6150.00 +XXXXXXXX                                                                               24  357
*6300.00 +XXXXX                                                                                  15  372
*6450.00 +XXXXX                                                                                  16  388
*6600.00 +XXX                                                                                     9  397
*6750.00 +X                                                                                       2  399
*6900.00 +                                                                                        1  400
*LAST    +                                                                                        0  400
            +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
               15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240
```

```
          run40

HISTOGRAM OF VARIABLE    1 tsvl
                                  SYMBOL  COUNT     MEAN      ST.DEV.
                                    X      400    8193.158    228.900
                        EACH SYMBOL REPRESENTS        3 OBSERVATIONS
INTERVAL                                                                                   FREQUENCY
NAME          15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240  INT. CUM.
            +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*7550.00 +                                                                                  0    0
*7600.00 +                                                                                  1    1
*7650.00 +                                                                                  0    1
*7700.00 +XX                                                                                7    8
*7750.00 +XX                                                                                5   13
*7800.00 +XXX                                                                               9   22
*7850.00 +XXX                                                                              10   32
*7900.00 +XXX                                                                              10   42
*7950.00 +XXXX                                                                             12   54
*8000.00 +XXXXXXXX                                                                         25   79
*8050.00 +XXXXXXXXXX                                                                       31  110
*8100.00 +XXXXXXXX                                                                         25  135
*8150.00 +XXXXXXXXXXXX                                                                     35  170
*8200.00 +XXXXXXXXXXX                                                                      34  204
*8250.00 +XXXXXXXXXX                                                                       31  235
*8300.00 +XXXXXXXXXXX                                                                      32  267
*8350.00 +XXXXXXXXXXXXX                                                                    38  305
*8400.00 +XXXXXXX                                                                          21  326
*8450.00 +XXXXXXXX                                                                         23  349
*8500.00 +XXXXX                                                                            15  364
*8550.00 +XXXXX                                                                            14  378
*8600.00 +XXX                                                                              10  388
*8650.00 +X                                                                                 3  391
*8700.00 +X                                                                                 3  394
*8750.00 +X                                                                                 3  397
*8800.00 +X                                                                                 2  399
*8850.00 +                                                                                  1  400
*LAST    +                                                                                  0  400
            +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240
```

```
          run40

HISTOGRAM OF VARIABLE     2 tsvn
                                    SYMBOL   COUNT      MEAN      ST.DEV.
                                      X       400     9098.424     184.223
                            EACH SYMBOL REPRESENTS        3 OBSERVATIONS
INTERVAL                                                                                         FREQUENCY
NAME          15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240   INT. CUM.
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*8500.00 +                                                                                       0    0
*8550.00 +                                                                                       1    1
*8600.00 +                                                                                       0    1
*8650.00 +                                                                                       1    2
*8700.00 +XX                                                                                     5    7
*8750.00 +XXX                                                                                   10   17
*8800.00 +XX                                                                                     7   24
*8850.00 +XXXX                                                                                  13   37
*8900.00 +XXXXXX                                                                                17   54
*8950.00 +XXXXXXXXX                                                                             26   80
*9000.00 +XXXXXXXXXXXXX                                                                         40  120
*9050.00 +XXXXXXXXXXXX                                                                          37  157
*9100.00 +XXXXXXXXXXXXXX                                                                        43  200
*9150.00 +XXXXXXXXXXXXXX                                                                        42  242
*9200.00 +XXXXXXXXXXXXXXX                                                                       44  286
*9250.00 +XXXXXXXXXXX                                                                           32  318
*9300.00 +XXXXXXXXXX                                                                            30  348
*9350.00 +XXXXXX                                                                                19  367
*9400.00 +XXXX                                                                                  12  379
*9450.00 +XXXX                                                                                  12  391
*9500.00 +X                                                                                      3  394
*9550.00 +X                                                                                      3  397
*9600.00 +X                                                                                      2  399
*9650.00 +                                                                                       1  400
*LAST    +                                                                                       0  400
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240
```

```
          run40

HISTOGRAM OF VARIABLE     3 tsvh
                                    SYMBOL   COUNT      MEAN      ST.DEV.
                                      X       400     9834.551    149.961
                             EACH SYMBOL REPRESENTS          3 OBSERVATIONS
INTERVAL                                                                             FREQUENCY
NAME           15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240  INT. CUM.
             +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*9350.00  +                                                                                     0    0
*9400.00  +                                                                                     1    1
*9450.00  +                                                                                     0    1
*9500.00  +X                                                                                    2    3
*9550.00  +XXXXX                                                                               14   17
*9600.00  +XXX                                                                                  9   26
*9650.00  +XXXXX                                                                               16   42
*9700.00  +XXXXXXXXXX                                                                          30   72
*9750.00  +XXXXXXXXXXXXXXXX                                                                    47  119
*9800.00  +XXXXXXXXXXXXXXXX                                                                    47  166
*9850.00  +XXXXXXXXXXXXXXXX                                                                    49  215
*9900.00  +XXXXXXXXXXXXXXXXXX                                                                  55  270
*9950.00  +XXXXXXXXXXXXXX                                                                      42  312
*10000.0  +XXXXXXXXXXXX                                                                        36  348
*10050.0  +XXXXXXX                                                                             21  369
*10100.0  +XXXXXXX                                                                             20  389
*10150.0  +X                                                                                    4  393
*10200.0  +X                                                                                    2  395
*10250.0  +X                                                                                    4  399
*10300.0  +                                                                                     1  400
*LAST     +                                                                                     0  400
             +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
               15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240
```

```
run41

HISTOGRAM OF VARIABLE     1 tsv1
                              SYMBOL   COUNT      MEAN      ST.DEV.
                                X       400    6004.579     476.274
                         EACH SYMBOL REPRESENTS        3 OBSERVATIONS
INTERVAL                                                                                       FREQUENCY
NAME          15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240   INT. CUM.
             +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*4500.00 +                                                                                        0    0
*4650.00 +                                                                                        1    1
*4800.00 +                                                                                        1    2
*4950.00 +X                                                                                       2    4
*5100.00 +XXX                                                                                    10   14
*5250.00 +XXXXX                                                                                  15   29
*5400.00 +XXXXX                                                                                  14   43
*5550.00 +XXXXXXX                                                                                21   64
*5700.00 +XXXXXXXXXXXXXX                                                                         43  107
*5850.00 +XXXXXXXXXXXXXXX                                                                        46  153
*6000.00 +XXXXXXXXXXXXXXX                                                                        45  198
*6150.00 +XXXXXXXXXXXXXX                                                                         41  239
*6300.00 +XXXXXXXXXXXXXX                                                                         43  282
*6450.00 +XXXXXXXXXXXXXX                                                                         42  324
*6600.00 +XXXXXXXXXXXX                                                                           36  360
*6750.00 +XXXXXXXX                                                                               23  383
*6900.00 +XX                                                                                      6  389
*7050.00 +XXX                                                                                     8  397
*7200.00 +X                                                                                       2  399
*7350.00 +                                                                                        0  399
*7500.00 +                                                                                        0  399
*7650.00 +                                                                                        1  400
*LAST    +                                                                                        0  400
             +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240
```

```
              run41

HISTOGRAM OF VARIABLE     2 tsvn
                                        SYMBOL   COUNT       MEAN      ST.DEV.
                                          X       400     6868.333     469.786
                               EACH SYMBOL REPRESENTS          3 OBSERVATIONS
INTERVAL                                                                                      FREQUENCY
NAME          15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240   INT. CUM.
             +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*5400.00 +                                                                                      0    0
*5550.00 +                                                                                      1    1
*5700.00 +                                                                                      1    2
*5850.00 +XX                                                                                    5    7
*6000.00 +XXXX                                                                                 11   18
*6150.00 +XXXX                                                                                 13   31
*6300.00 +XXXXXX                                                                               17   48
*6450.00 +XXXXXXXX                                                                             24   72
*6600.00 +XXXXXXXXXXXXX                                                                        40  112
*6750.00 +XXXXXXXXXXXXXXXXX                                                                    50  162
*6900.00 +XXXXXXXXXXXXXXX                                                                      44  206
*7050.00 +XXXXXXXXXXXXXXX                                                                      45  251
*7200.00 +XXXXXXXXXXXXXXX                                                                      46  297
*7350.00 +XXXXXXXXXXXXXXX                                                                      44  341
*7500.00 +XXXXXXXXXX                                                                           30  371
*7650.00 +XXXXX                                                                                16  387
*7800.00 +XXX                                                                                   8  395
*7950.00 +X                                                                                     2  397
*8100.00 +X                                                                                     2  399
*8250.00 +                                                                                      0  399
*8400.00 +                                                                                      0  399
*8550.00 +                                                                                      1  400
*LAST    +                                                                                      0  400
             +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240
```

```
           run41

HISTOGRAM OF VARIABLE    3 tsvh
                                  SYMBOL  COUNT     MEAN      ST.DEV.
                                    X       400   7645.939    460.205
                         EACH SYMBOL REPRESENTS        3 OBSERVATIONS
INTERVAL                                                                               FREQUENCY
NAME          15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240  INT. CUM.
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*6150.00 +                                                                                   0    0
*6300.00 +                                                                                   1    1
*6450.00 +                                                                                   1    2
*6600.00 +X                                                                                  4    6
*6750.00 +XXX                                                                                8   14
*6900.00 +XXXX                                                                              12   26
*7050.00 +XXXXXX                                                                            18   44
*7200.00 +XXXXXXX                                                                           21   65
*7350.00 +XXXXXXXXXXXXX                                                                     40  105
*7500.00 +XXXXXXXXXXXXXX                                                                    43  148
*7650.00 +XXXXXXXXXXXXXXXXX                                                                 50  198
*7800.00 +XXXXXXXXXXXXXXX                                                                   44  242
*7950.00 +XXXXXXXXXXXXXXX                                                                   46  288
*8100.00 +XXXXXXXXXXXXXXXX                                                                  47  335
*8250.00 +XXXXXXXXXX                                                                        31  366
*8400.00 +XXXXXXX                                                                           20  386
*8550.00 +XXX                                                                               10  396
*8700.00 +                                                                                   1  397
*8850.00 +X                                                                                  2  399
*9000.00 +                                                                                   0  399
*9150.00 +                                                                                   1  400
*LAST    +                                                                                   0  400
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240
```

```
run42

HISTOGRAM OF VARIABLE     1 tsv1
                                   SYMBOL   COUNT      MEAN      ST.DEV.
                                     X       400     3806.982     535.560
                         EACH SYMBOL REPRESENTS          3 OBSERVATIONS
INTERVAL                                                                                       FREQUENCY
NAME          15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240   INT. CUM.
         -----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*2100.00 +                                                                                     0    0
*2250.00 +                                                                                     1    1
*2400.00 +                                                                                     0    1
*2550.00 +X                                                                                    2    3
*2700.00 +X                                                                                    4    7
*2850.00 +XXX                                                                                  9   16
*3000.00 +XX                                                                                   7   23
*3150.00 +XXXXXXX                                                                             21   44
*3300.00 +XXXXXXX                                                                             22   66
*3450.00 +XXXXXXXXXXXXX                                                                       39  105
*3600.00 +XXXXXXXXXXXX                                                                        37  142
*3750.00 +XXXXXXXXXXXXXX                                                                      41  183
*3900.00 +XXXXXXXXXXXXXXXXX                                                                   51  234
*4050.00 +XXXXXXXXXXXXXXX                                                                     45  279
*4200.00 +XXXXXXXXX                                                                           28  307
*4350.00 +XXXXXXXXX                                                                           26  333
*4500.00 +XXXXXXXX                                                                            23  356
*4650.00 +XXXXXX                                                                              19  375
*4800.00 +XXXX                                                                                11  386
*4950.00 +XX                                                                                   6  392
*5100.00 +XX                                                                                   6  398
*5250.00 +X                                                                                    2  400
*LAST    +                                                                                     0  400
         -----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240
```

```
              run42

HISTOGRAM OF VARIABLE    2 tsvn
                                    SYMBOL   COUNT      MEAN       ST.DEV.
                                      X       400     4627.875     539.358
                         EACH SYMBOL REPRESENTS           3 OBSERVATIONS
INTERVAL                                                                                    FREQUENCY
NAME          15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240  INT.  CUM.
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*2850.00 +                                                                                    0     0
*3000.00 +                                                                                    1     1
*3150.00 +                                                                                    1     2
*3300.00 +                                                                                    1     3
*3450.00 +X                                                                                   3     6
*3600.00 +XX                                                                                  5    11
*3750.00 +XXX                                                                                 9    20
*3900.00 +XXXXX                                                                              15    35
*4050.00 +XXXXXX                                                                             19    54
*4200.00 +XXXXXXXXXX                                                                         29    83
*4350.00 +XXXXXXXXXXXXXXX                                                                    44   127
*4500.00 +XXXXXXXXXXXXX                                                                      38   165
*4650.00 +XXXXXXXXXXXXXX                                                                     42   207
*4800.00 +XXXXXXXXXXXXXXX                                                                    44   251
*4350.00 +XXXXXXXXXXXXXX                                                                     41   292
*5100.00 +XXXXXXXXXX                                                                         31   323
*5250.00 +XXXXXXXX                                                                           24   347
*5400.00 +XXXXXXX                                                                            21   368
*5550.00 +XXXX                                                                               11   379
*5700.00 +XXXX                                                                               12   391
*5850.00 +XX                                                                                  6   397
*6000.00 +X                                                                                   2   399
*LAST    +                                                                                    1   400
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240
```

```
        run42

HISTOGRAM OF VARIABLE    3 tsvh
                                SYMBOL   COUNT      MEAN     ST.DEV.
                                  X       400     5448.331   532.267
                          EACH SYMBOL REPRESENTS        3 OBSERVATIONS
INTERVAL                                                                                    FREQUENCY
NAME          15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240  INT. CUM.
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*3750.00 +                                                                                      0    0
*3900.00 +                                                                                      1    1
*4050.00 +X                                                                                     2    3
*4200.00 +                                                                                      1    4
*4350.00 +X                                                                                     2    6
*4500.00 +XXX                                                                                   8   14
*4650.00 +XXX                                                                                  10   24
*4800.00 +XXXXXXX                                                                              22   46
*4950.00 +XXXXXXX                                                                              20   66
*5100.00 +XXXXXXXXXXXXXX                                                                       42  108
*5250.00 +XXXXXXXXXXXXX                                                                        40  148
*5400.00 +XXXXXXXXXXXX                                                                         35  183
*5550.00 +XXXXXXXXXXXXXXXX                                                                     49  232
*5700.00 +XXXXXXXXXXXXX                                                                        39  271
*5850.00 +XXXXXXXXXXXX                                                                         36  307
*6000.00 +XXXXXXXXXXX                                                                          34  341
*6150.00 +XXXXXX                                                                               17  358
*6300.00 +XXXXX                                                                                15  373
*6450.00 +XXXXX                                                                                15  388
*6600.00 +XXX                                                                                   9  397
*6750.00 +                                                                                      0  397
*6900.00 +X                                                                                     3  400
*LAST    +                                                                                      0  400
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240
```

```
run43

HISTOGRAM OF VARIABLE    1 tsv1
                              SYMBOL   COUNT      MEAN      ST.DEV.
                                X       400     8689.436    241.858
                         EACH SYMBOL REPRESENTS        3 OBSERVATIONS
INTERVAL                                                                                 FREQUENCY
NAME         15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240   INT. CUM.
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*8050.00 +                                                                                  0    0
*8100.00 +X                                                                                 3    3
*8150.00 +X                                                                                 4    7
*8200.00 +X                                                                                 4   11
*8250.00 +XX                                                                                6   17
*8300.00 +XXXX                                                                             12   29
*8350.00 +XX                                                                                5   34
*8400.00 +XXXX                                                                             12   46
*8450.00 +XXXXX                                                                            15
*8500.00 +XXXXXXX                                                                          21   82
*8550.00 +XXXXXXXXXXX                                                                      34  116
*8600.00 +XXXXXXXXX                                                                        27  143
*8650.00 +XXXXXXXXXX                                                                       29  172
*8700.00 +XXXXXXXXXX                                                                       31  203
*8750.00 +XXXXXXXXXX                                                                       29  232
*8800.00 +XXXXXXXXXXXX                                                                     35  267
*8850.00 +XXXXXXXXXXXX                                                                     35  302
*8900.00 +XXXXXXXX                                                                         24  326
*8950.00 +XXXXXXX                                                                          22  348
*9000.00 +XXXX                                                                             13  361
*9050.00 +XXXX                                                                             13  374
*9100.00 +XXX                                                                              10  384
*9150.00 +XX                                                                                5  389
*9200.00 +X                                                                                 3  392
*9250.00 +X                                                                                 2  394
*9300.00 +XX                                                                                5  399
*9350.00 +                                                                                  0  399
*9400.00 +                                                                                  1  400
*LAST    +                                                                                  0  400
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
             15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240
```

```
                 run43

HISTOGRAM OF VARIABLE     2 tsvn
                                       SYMBOL   COUNT      MEAN       ST.DEV.
                                         X       400     9517.460     196.766
                            EACH SYMBOL REPRESENTS          3 OBSERVATIONS
INTERVAL                                                                                  FREQUENCY
NAME           15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240   INT. CUM.
              +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*8900.00 +                                                                                     0    0
*8950.00 +                                                                                     1    1
*9000.00 +                                                                                     0    1
*9050.00 +X                                                                                    3    4
*9100.00 +XX                                                                                   5    9
*9150.00 +XX                                                                                   7   16
*9200.00 +XXX                                                                                  9   25
*9250.00 +XXXX                                                                                11   36
*9300.00 +XXXXX                                                                               15   51
*9350.00 +XXXXXXXX                                                                            23   74
*9400.00 +XXXXXXXXXXXX                                                                        35  109
*9450.00 +XXXXXXXXXXXXXX                                                                      41  150
*9500.00 +XXXXXXXXX                                                                           28  178
*9550.00 +XXXXXXXXXXXXXXXX                                                                    49  227
*9600.00 +XXXXXXXXXXXXXX                                                                      41  268
*9650.00 +XXXXXXXXXXX                                                                         32  300
*9700.00 +XXXXXXXXXX                                                                          29  329
*9750.00 +XXXXXXXXX                                                                           27  356
*9800.00 +XXXXX                                                                               16  372
*9850.00 +XXXX                                                                                12  384
*9900.00 +XX                                                                                   7  391
*9950.00 +X                                                                                    2  393
*10000.0 +X                                                                                    2  395
*10050.0 +X                                                                                    4  399
*10100.0 +                                                                                     1  400
*LAST    +                                                                                     0  400
              +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
               15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240
```

```
                    run43

HISTOGRAM OF VARIABLE     3 tsvh
                                   SYMBOL   COUNT      MEAN       ST.DEV.
                                     X       400    10199.718     163.162
                              EACH SYMBOL REPRESENTS         3 OBSERVATIONS
INTERVAL                                                                                            FREQUENCY
NAME             15    30    45    60    75    90   105   120   135   150   165   180   195   210   225   240  INT. CUM.
               +-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
*9700.00 +                                                                                                0    0
*9750.00 +                                                                                                1    1
*9800.00 +                                                                                                0    1
*9850.00 +XX                                                                                              6    7
*9900.00 +XXX                                                                                            10   17
*9950.00 +XXXX                                                                                           13   30
*10000.0 +XXXX                                                                                           12   42
*10050.0 +XXXXXXXXX                                                                                      26   68
*10100.0 +XXXXXXXXXXXXXXX                                                                                44  112
*10150.0 +XXXXXXXXXXXXX                                                                                  38  150
*10200.0 +XXXXXXXXXXXXXXXXX                                                                              50  200
*10250.0 +XXXXXXXXXXXXXXXXX                                                                              50  250
*10300.0 +XXXXXXXXXXXXX                                                                                  40  290
*10350.0 +XXXXXXXXXXXX                                                                                   35  325
*10400.0 +XXXXXXXXXXXX                                                                                   36  361
*10450.0 +XXXX                                                                                           13  374
*10500.0 +XXXXX                                                                                          16  390
*10550.0 +X                                                                                               3  393
*10600.0 +X                                                                                               3  396
*10650.0 +X                                                                                               3  399
*10700.0 +                                                                                                1  400
*LAST    +                                                                                                0  400
               +-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
                 15    30    45    60    75    90   105   120   135   150   165   180   195   210   225   240
```

```
            run44

HISTOGRAM OF VARIABLE    1 tsv1
                                  SYMBOL  COUNT     MEAN     ST.DEV.
                                    X      400    6286.240   517.897
                          EACH SYMBOL REPRESENTS         3 OBSERVATIONS
INTERVAL                                                                                       FREQUENCY
NAME          15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240  INT. CUM.
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*4800.00 +                                                                                    0    0
*4950.00 +X                                                                                   2    2
*5100.00 +                                                                                    1    3
*5250.00 +XXX                                                                                 8   11
*5400.00 +XXXX                                                                               11   22
*5550.00 +XXXXX                                                                              15   37
*5700.00 +XXX                                                                                10   47
*5850.00 +XXXXXXXXXXX                                                                        32   79
*6000.00 +XXXXXXXXXXXX                                                                       37  116
*6150.00 +XXXXXXXXXXXXXX                                                                     43  159
*6300.00 +XXXXXXXXXXXXXX                                                                     43  202
*6450.00 +XXXXXXXXXXXX                                                                       37  239
*6600.00 +XXXXXXXXXXXXXX                                                                     41  280
*6750.00 +XXXXXXXXXXXXX                                                                      39  319
*6900.00 +XXXXXXXXXXXX                                                                       36  355
*7050.00 +XXXXXXXX                                                                           24  379
*7200.00 +XXX                                                                                 8  387
*7350.00 +XX                                                                                  6  393
*7500.00 +XX                                                                                  5  398
*7650.00 +                                                                                    1  399
*7800.00 +                                                                                    0  399
*7950.00 +                                                                                    0  399
*8100.00 +                                                                                    1  400
*LAST    +                                                                                    0  400
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240
```

```
               run44

HISTOGRAM OF VARIABLE      2 tsvn
                                    SYMBOL   COUNT      MEAN      ST.DEV.
                                      X       400     7078.600    511.406
                           EACH SYMBOL REPRESENTS          3 OBSERVATIONS
INTERVAL                                                                                    FREQUENCY
NAME          15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240  INT. CUM.
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*5550.00  +                                                                                   0    0
*5700.00  +X                                                                                  2    2
*5850.00  +                                                                                   1    3
*6000.00  +XX                                                                                 5    8
*6150.00  +XXXX                                                                              12   20
*6300.00  +XXX                                                                               10   30
*6450.00  +XXXXXX                                                                            17   47
*6600.00  +XXXXXXX                                                                           20   67
*6750.00  +XXXXXXXXXXX                                                                       34  101
*6900.00  +XXXXXXXXXXXXXXX                                                                   46  147
*7050.00  +XXXXXXXXXXXX                                                                      37  184
*7200.00  +XXXXXXXXXXXXXXXX                                                                  49  233
*7350.00  +XXXXXXXXXXX                                                                       33  266
*7500.00  +XXXXXXXXXXXXXXX                                                                   45  311
*7650.00  +XXXXXXXXXXXX                                                                      37  348
*7800.00  +XXXXXXXXXX                                                                        29  377
*7950.00  +XXX                                                                               10  387
*8100.00  +XXX                                                                                9  396
*8250.00  +                                                                                   1  397
*8400.00  +X                                                                                  2  399
*8550.00  +                                                                                   0  399
*8700.00  +                                                                                   0  399
*8850.00  +                                                                                   1  400
*LAST     +                                                                                   0  400
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240
```

```
            run44

HISTOGRAM OF VARIABLE     3 tsvh
                                 SYMBOL   COUNT      MEAN     ST.DEV.
                                    X       400    7796.525    502.324
                          EACH SYMBOL REPRESENTS          3 OBSERVATIONS
INTERVAL                                                                              FREQUENCY
NAME          15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240  INT. CUM.
        +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*6300.00 +                                                                                  0    0
*6450.00 +                                                                                  1    1
*6600.00 +X                                                                                 2    3
*6750.00 +XX                                                                                7   10
*6900.00 +XXX                                                                              10   20
*7050.00 +XXXX                                                                             13   33
*7200.00 +XXXXXX                                                                           17   50
*7350.00 +XXXXXXXX                                                                         25   75
*7500.00 +XXXXXXXXXXXX                                                                     37  112
*7650.00 +XXXXXXXXXXXXXX                                                                   43  155
*7800.00 +XXXXXXXXXXXXX                                                                    38  193
*7950.00 +XXXXXXXXXXXXXXXX                                                                 48  241
*8100.00 +XXXXXXXXXXXXX                                                                    40  281
*8250.00 +XXXXXXXXXXXXXX                                                                   41  322
*8400.00 +XXXXXXXXXXX                                                                      34  356
*8550.00 +XXXXXXXXX                                                                        26  382
*8700.00 +XXX                                                                               9  391
*8850.00 +XX                                                                                5  396
*9000.00 +X                                                                                 2  398
*9150.00 +                                                                                  1  399
*9300.00 +                                                                                  0  399
*9450.00 +                                                                                  1  400
*LAST    +                                                                                  0  400
        +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240
```

```
          run45

HISTOGRAM OF VARIABLE      1 tsvl
                                      SYMBOL   COUNT      MEAN      ST.DEV.
                                         X      400     3873.588     585.742
                             EACH SYMBOL REPRESENTS          3 OBSERVATIONS
INTERVAL                                                                                              FREQUENCY
NAME           15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240       INT. CUM.
            +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*1950.00 +                                                                                           0    0
*2100.00 +                                                                                           1    1
*2250.00 +                                                                                           0    1
*2400.00 +                                                                                           1    2
*2550.00 +X                                                                                          2    4
*2700.00 +X                                                                                          3    7
*2850.00 +XXXX                                                                                      11   18
*3000.00 +XX                                                                                         7   25
*3150.00 +XXXXXX                                                                                    18   43
*3300.00 +XXXXXX                                                                                    19   62
*3450.00 +XXXXXXXXXXX                                                                               32   94
*3600.00 +XXXXXXXXXXXXX                                                                             39  133
*3750.00 +XXXXXXXXXXXX                                                                              37  170
*3900.00 +XXXXXXXXXXXXXX                                                                            41  211
*4050.00 +XXXXXXXXXXXXXX                                                                            43  254
*4200.00 +XXXXXXXXXXXXX                                                                             38  292
*4350.00 +XXXXXX                                                                                    19  311
*4500.00 +XXXXXXXXX                                                                                 28  339
*4650.00 +XXXXXX                                                                                    19  358
*4800.00 +XXXXXX                                                                                    17  375
*4950.00 +XXXX                                                                                      11  386
*5100.00 +XX                                                                                         6  392
*5250.00 +X                                                                                          4  396
*5400.00 +X                                                                                          4  400
*LAST    +                                                                                           0  400
            +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
               15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240
```

```
run45

HISTOGRAM OF VARIABLE    2 tsvn
                                      SYMBOL   COUNT      MEAN     ST.DEV.
                                        X       400     4629.098    588.532
                              EACH SYMBOL REPRESENTS        3 OBSERVATIONS
INTERVAL                                                                                    FREQUENCY
NAME          15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240  INT. CUM.
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*2700.00 +                                                                                   0    0
*2850.00 +                                                                                   1    1
*3000.00 +                                                                                   1    2
*3150.00 +                                                                                   1    3
*3300.00 +                                                                                   1    4
*3450.00 +X                                                                                  4    8
*3600.00 +XXX                                                                                9   17
*3750.00 +XX                                                                                 7   24
*3900.00 +XXXXXX                                                                            18   42
*4050.00 +XXXXXXX                                                                           21   63
*4200.00 +XXXXXXXXXX                                                                        31   94
*4350.00 +XXXXXXXXXXXXX                                                                     39  133
*4500.00 +XXXXXXXXXXXX                                                                      37  170
*4650.00 +XXXXXXXXXXXXX                                                                     38  208
*4800.00 +XXXXXXXXXXXXX                                                                     40  248
*4950.00 +XXXXXXXXXXXXXX                                                                    42  290
*5100.00 +XXXXXXXX                                                                          23  313
*5250.00 +XXXXXXXXX                                                                         28  341
*5400.00 +XXXXXX                                                                            19  360
*5550.00 +XXXXX                                                                             15  375
*5700.00 +XXX                                                                                8  383
*5850.00 +XXX                                                                               10  393
*6000.00 +X                                                                                  4  397
*6150.00 +X                                                                                  3  400
*LAST    +                                                                                   0  400
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240
```

```
                 run45

HISTOGRAM OF VARIABLE    3 tsvh
                                     SYMBOL  COUNT      MEAN      ST.DEV.
                                       X      400    5383.851    582.328
                           EACH SYMBOL REPRESENTS          3 OBSERVATIONS
INTERVAL                                                                                        FREQUENCY
NAME         15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240   INT. CUM.
            +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*3600.00 +                                                                                       0    0
*3750.00 +X                                                                                      2    2
*3900.00 +                                                                                       1    3
*4050.00 +X                                                                                      2    5
*4200.00 +                                                                                       1    6
*4350.00 +XXX                                                                                    9   15
*4500.00 +XX                                                                                     7   22
*4650.00 +XXXXXXX                                                                               21   43
*4800.00 +XXXXXX                                                                                18   61
*4950.00 +XXXXXXXXXXX                                                                           32   93
*5100.00 +XXXXXXXXXXXXXX                                                                        41  134
*5250.00 +XXXXXXXXXX                                                                            31  165
*5400.00 +XXXXXXXXXXXXX                                                                         39  204
*5550.00 +XXXXXXXXXXXXXX                                                                        42  246
*5700.00 +XXXXXXXXXXXXX                                                                         38  284
*5850.00 +XXXXXXXXXXX                                                                           32  316
*6000.00 +XXXXXXXXX                                                                             26  342
*6150.00 +XXXXX                                                                                 15  357
*6300.00 +XXXXX                                                                                 16  373
*6450.00 +XXXX                                                                                  13  386
*6600.00 +XX                                                                                     7  393
*6750.00 +X                                                                                      4  397
*6900.00 +X                                                                                      3  400
*LAST    +                                                                                       0  400
            +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
             15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240
```

```
                     run46

HISTOGRAM OF VARIABLE    I tsvI
                                       SYMBOL   COUNT      MEAN      ST.DEV.
                                         X       400     8015.651     207.555
                              EACH SYMBOL REPRESENTS          3 OBSERVATIONS
INTERVAL                                                                                  FREQUENCY
NAME          15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240  INT. CUM.
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*7300.00 +                                                                                    0    0
*7375.00 +                                                                                    0    0
*7450.00 +                                                                                    1    1
*7525.00 +                                                                                    0    1
*7600.00 +XXXX                                                                               11   12
*7675.00 +XXXX                                                                               13   25
*7750.00 +XXXX                                                                               12   37
*7825.00 +XXXXXXXXX                                                                          28   65
*7900.00 +XXXXXXXXXXXXXXXXXXX                                                                56  121
*7975.00 +XXXXXXXXXXXXXXXX                                                                   47  168
*8050.00 +XXXXXXXXXXXXXXXXX                                                                  52  220
*8125.00 +XXXXXXXXXXXXXXXXXXXXXXX                                                            68  288
*8200.00 +XXXXXXXXXX                                                                         31  319
*8275.00 +XXXXXXXXXXXX                                                                       37  356
*8350.00 +XXXXXXXX                                                                           24  380
*8425.00 +XXXX                                                                               11  391
*8500.00 +X                                                                                   4  395
*8575.00 +X                                                                                   3  398
*8650.00 +X                                                                                   2  400
*8725.00 +                                                                                    0  400
*8800.00 +                                                                                    0  400
*LAST    +                                                                                    0  400
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240
```

```
            run46

HISTOGRAM OF VARIABLE    2 tsvn
                                  SYMBOL   COUNT      MEAN      ST.DEV.
                                    X       400     8552.046     175.749
                          EACH SYMBOL REPRESENTS           3 OBSERVATIONS
INTERVAL
NAME           15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240    FREQUENCY
             +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+  INT. CUM.
*7825.00 +
*7900.00 +                                                                                      0    0
*7975.00 +                                                                                      0    0
*8050.00 +                                                                                      0    0
*8125.00 +                                                                                      1    1
*8200.00 +XXX                                                                                   1    2
*8275.00 +XXXX                                                                                  9   11
*8350.00 +XXXXXX                                                                               13   24
*8425.00 +XXXXXXXXXXXXXXXXXXX                                                                  19   43
*8500.00 +XXXXXXXXXXXXXXXXXX                                                                   56   99
*8575.00 +XXXXXXXXXXXXXXXXXXXXXX                                                               55  154
*8650.00 +XXXXXXXXXXXXXXXXXXXXXX                                                               66  220
*8725.00 +XXXXXXXXXXXXXXXX                                                                     66  286
*8800.00 +XXXXXXXXXXX                                                                          48  334
*8875.00 +XXXXXXXX                                                                             33  367
*8950.00 +X                                                                                    24  391
*9025.00 +X                                                                                     4  395
*9100.00 +X                                                                                     2  397
*9175.00 +                                                                                      3  400
*9250.00 +                                                                                      0  400
*9325.00 +                                                                                      0  400
*LAST    +                                                                                      0  400
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+      0  400
               15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240
```

```
                   run46

HISTOGRAM OF VARIABLE     3 tsvh
                                  SYMBOL   COUNT      MEAN      ST.DEV.
                                    X       400     8999.833     153.049
                            EACH SYMBOL REPRESENTS          3 OBSERVATIONS
INTERVAL                                                                                          FREQUENCY
NAME            15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240    INT. CUM.
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*8275.00   +                                                                                    0    0
*8350.00   +                                                                                    0    0
*8425.00   +                                                                                    0    0
*8500.00   +                                                                                    0    0
*8575.00   +                                                                                    1    1
*8650.00   +                                                                                    1    2
*8725.00   +XXXXX                                                                              16   18
*8800.00   +XXXXXX                                                                             18   36
*8875.00   +XXXXXXXXXXXXXXXXX                                                                  50   86
*8950.00   +XXXXXXXXXXXXXXXXXXXXXXX                                                            69  155
*9025.00   +XXXXXXXXXXXXXXXXXXXXXXX                                                            70  225
*9100.00   +XXXXXXXXXXXXXXXXXXXXXXX                                                            70  295
*9175.00   +XXXXXXXXXXXXXXXXXX                                                                 54  349
*9250.00   +XXXXXXXXXX                                                                         30  379
*9325.00   +XXXXX                                                                              15  394
*9400.00   +X                                                                                   3  397
*9475.00   +X                                                                                   3  400
*9550.00   +                                                                                    0  400
*9625.00   +                                                                                    0  400
*9700.00   +                                                                                    0  400
*9775.00   +                                                                                    0  400
*LAST      +                                                                                    0  400
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240
```

```
            run47

HISTOGRAM OF VARIABLE     1 tsvl
                               SYMBOL   COUNT       MEAN       ST.DEV.
                                 X       400      6079.441      424.88[illegible]
                     EACH SYMBOL REPRESENTS            3 OBSERVATIONS
INTERVAL                                                                                  FREQUENCY
NAME         15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240   INT. CUM.
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*4600.00 +                                                                                    0    0
*4750.00 +                                                                                    0    0
*4900.00 +                                                                                    1    1
*5050.00 +X                                                                                   2    3
*5200.00 +XX                                                                                  5    8
*5350.00 +XXX                                                                                10   18
*5500.00 +XXXXXXX                                                                            22   40
*5650.00 +XXXXXX                                                                             18   58
*5800.00 +XXXXXXXXXXXXXXXX                                                                   48  106
*5950.00 +XXXXXXXXXXXXXXX                                                                    46  152
*6100.00 +XXXXXXXXXXXXXXXXXXX                                                                56  208
*6250.00 +XXXXXXXXXXXXX                                                                      40  248
*6400.00 +XXXXXXXXXXXXXXXXXX                                                                 53  301
*6550.00 +XXXXXXXXXXXXXXX                                                                    45  346
*6700.00 +XXXXXXXXXX                                                                         30  376
*6850.00 +XXXX                                                                               12  388
*7000.00 +XXX                                                                                 9  397
*7150.00 +                                                                                    1  398
*7300.00 +                                                                                    1  399
*7450.00 +                                                                                    1  400
*7600.00 +                                                                                    0  400
*LAST    +                                                                                    0  400
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
             15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240
```

```
                  run47

HISTOGRAM OF VARIABLE    2 tsvn
                                   SYMBOL   COUNT      MEAN      ST.DEV.
                                     X       400     6594.195     419.579
                              EACH SYMBOL REPRESENTS        3 OBSERVATIONS
INTERVAL                                                                                          FREQUENCY
NAME          15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240   INT.  CUM.
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*5500.00   +X                                                                                  2     2
*5650.00   +X                                                                                  4     6
*5800.00   +XXX                                                                               10    16
*5950.00   +XXXXX                                                                             14    30
*6100.00   +XXXXXX                                                                            17    47
*6250.00   +XXXXXXXXXXXX                                                                      36    83
*6400.00   +XXXXXXXXXXXXXXX                                                                   44   127
*6550.00   +XXXXXXXXXXXXXXXXXXX                                                               56   183
*6700.00   +XXXXXXXXXXXXXXXXX                                                                 51   234
*6850.00   +XXXXXXXXXXXXXX                                                                    42   276
*7000.00   +XXXXXXXXXXXXXXXXXX                                                                53   329
*7150.00   +XXXXXXXXXXXXX                                                                     40   369
*7300.00   +XXXXXX                                                                            19   388
*7450.00   +XXX                                                                                8   396
*7600.00   +X                                                                                  2   398
*7750.00   +                                                                                   1   399
*7900.00   +                                                                                   0   399
*LAST      +                                                                                   1   400
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240
```

```
            run47

HISTOGRAM OF VARIABLE     3 tsvh
                                       SYMBOL  COUNT      MEAN      ST.DEV.
                                         X      400     7063.596     413.655
                              EACH SYMBOL REPRESENTS         3 OBSERVATIONS
INTERVAL                                                                                        FREQUENCY
NAME          15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240   INT. CUM.
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*5650.00   +                                                                                    0    0
*5800.00   +                                                                                    0    0
*5950.00   +                                                                                    1    1
*6100.00   +XX                                                                                  5    6
*6250.00   +XX                                                                                  7   13
*6400.00   +XXXX                                                                               13   26
*6550.00   +XXXXXXX                                                                            21   47
*6700.00   +XXXXXXXXX                                                                          27   74
*6850.00   +XXXXXXXXXXXXXXXX                                                                   47  121
*7000.00   +XXXXXXXXXXXXXXXXX                                                                  52  173
*7150.00   +XXXXXXXXXXXXXXXXXX                                                                 53  226
*7300.00   +XXXXXXXXXXXXXXXX                                                                   48  274
*7450.00   +XXXXXXXXXXXXXXXXXX                                                                 53  327
*7600.00   +XXXXXXXXXXXXX                                                                      39  366
*7750.00   +XXXXXXX                                                                            21  387
*7900.00   +XXX                                                                                 9  396
*8050.00   +                                                                                    1  397
*8200.00   +X                                                                                   2  399
*8350.00   +                                                                                    0  399
*8500.00   +                                                                                    1  400
*8650.00   +                                                                                    0  400
*LAST      +                                                                                    0  400
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240
```

```
          run40

HISTOGRAM OF VARIABLE     1 tsv1
                                   SYMBOL   COUNT      MEAN      ST.DEV.
                                     X       400     4134.303     477.525
                        EACH SYMBOL REPRESENTS          3 OBSERVATIONS
INTERVAL                                                                                        FREQUENCY
NAME          15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240   INT. CUM.
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*2500.00 +                                                                                      0    0
*2650.00 +                                                                                      0    0
*2800.00 +                                                                                      1    1
*2950.00 +X                                                                                     2    3
*3100.00 +                                                                                      1    4
*3250.00 +XXX                                                                                   9   13
*3400.00 +XXX                                                                                   9   22
*3550.00 +XXXXXXX                                                                              21   43
*3700.00 +XXXXXXXXX                                                                            27   70
*3850.00 +XXXXXXXXXXXXXXX                                                                      46  116
*4000.00 +XXXXXXXXXXXXXX                                                                       42  158
*4150.00 +XXXXXXXXXXXXXXXXX                                                                    52  210
*4300.00 +XXXXXXXXXXXXXXXXX                                                                    51  261
*4450.00 +XXXXXXXXXXXX                                                                         37  298
*4600.00 +XXXXXXXXXXX                                                                          32  330
*4750.00 +XXXXXXXX                                                                             24  354
*4900.00 +XXXXXXX                                                                              20  374
*5050.00 +XXXXX                                                                                15  389
*5200.00 +XX                                                                                    7  396
*5350.00 +X                                                                                     3  399
*5500.00 +                                                                                      1  400
*LAST    +                                                                                      0  400
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240
```

```
          run48

HISTOGRAM OF VARIABLE    2 tsvn
                              SYMBOL  COUNT     MEAN      ST.DEV.
                                 X     400    4626.755    478.404
                         EACH SYMBOL REPRESENTS       3 OBSERVATIONS
INTERVAL                                                                            FREQUENCY
NAME          15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240  INT. CUM.
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*2950.00 +                                                                              0    0
*3100.00 +                                                                              0    0
*3250.00 +                                                                              1    1
*3400.00 +X                                                                             2    3
*3550.00 +                                                                              1    4
*3700.00 +XXX                                                                           8   12
*3850.00 +XXX                                                                           8   20
*4000.00 +XXXXXX                                                                       17   37
*4150.00 +XXXXXXX                                                                      22   59
*4300.00 +XXXXXXXXXXXX                                                                 37   96
*4450.00 +XXXXXXXXXXXXXXXXXX                                                           55  151
*4600.00 +XXXXXXXXXXXXXX                                                               42  193
*4750.00 +XXXXXXXXXXXXXXXX                                                             49  242
*4900.00 +XXXXXXXXXXXXXXXX                                                             48  290
*5050.00 +XXXXXXXXXXXX                                                                 35  325
*5200.00 +XXXXXXXX                                                                     24  349
*5350.00 +XXXXXXX                                                                      22  371
*5500.00 +XXXX                                                                         13  384
*5650.00 +XXXX                                                                         11  395
*5800.00 +X                                                                             2  397
*5950.00 +X                                                                             3  400
*LAST    +                                                                              0  400
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240
```

```
            run48

HISTOGRAM OF VARIABLE     3 tsvh
                                   SYMBOL  COUNT      MEAN      ST.DEV.
                                     X      400     5118.480     475.262
                              EACH SYMBOL REPRESENTS         3 OBSERVATIONS
INTERVAL                                                                                   FREQUENCY
NAME         15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240  INT. CUM.
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*3550.00 +                                                                                    0    0
*3700.00 +                                                                                    1    1
*3850.00 +X                                                                                   2    3
*4000.00 +                                                                                    0    3
*4150.00 +X                                                                                   3    6
*4300.00 +XXX                                                                                10   16
*4450.00 +XXXX                                                                               12   28
*4600.00 +XXXXXXXX                                                                           24   52
*4750.00 +XXXXXXXXXXXX                                                                       35   87
*4900.00 +XXXXXXXXXXXXXXXX                                                                   49  136
*5050.00 +XXXXXXXXXXXXXX                                                                     41  177
*5200.00 +XXXXXXXXXXXXXXXXXX                                                                 55  232
*5350.00 +XXXXXXXXXXXXXXXX                                                                   49  281
*5500.00 +XXXXXXXXXXXX                                                                       35  316
*5650.00 +XXXXXXXXXX                                                                         29  345
*5800.00 +XXXXXXXX                                                                           24  369
*5950.00 +XXX                                                                                 8  377
*6100.00 +XXXXX                                                                              16  393
*6250.00 +X                                                                                   4  397
*6400.00 +X                                                                                   3  400
*6550.00 +                                                                                    0  400
*LAST    +                                                                                    0  400
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
             15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240
```

```
          run49

HISTOGRAM OF VARIABLE    1 tsvl
                                   SYMBOL   COUNT     MEAN      ST.DEV.
                                     X       400    8637.408    212.885
                         EACH SYMBOL REPRESENTS        3 OBSERVATIONS
INTERVAL                                                                                         FREQUENCY
NAME          15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240   INT.  CUM.
            +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*7900.00 +                                                                                       0     0
*7975.00 +                                                                                       0     0
*8050.00 +                                                                                       0     0
*8125.00 +X                                                                                      3     3
*8200.00 +XXX                                                                                    9    12
*8275.00 +XXXX                                                                                  11    23
*8350.00 +XXXX                                                                                  11    34
*8425.00 +XXXXXXXX                                                                              25    59
*8500.00 +XXXXXXXXXXXXXXX                                                                       45   104
*8575.00 +XXXXXXXXXXXXXXXXX                                                                     52   156
*8650.00 +XXXXXXXXXXXXXXXXX                                                                     52   208
*8725.00 +XXXXXXXXXXXXXXXXXXX                                                                   56   264
*8800.00 +XXXXXXXXXXXXXXXX                                                                      48   312
*8875.00 +XXXXXXXXXXXX                                                                          37   349
*8950.00 +XXXXXXXX                                                                              23   372
*9025.00 +XXXXXX                                                                                18   390
*9100.00 +X                                                                                      3   393
*9175.00 +X                                                                                      4   397
*9250.00 +X                                                                                      3   400
*9325.00 +                                                                                       0   400
*9400.00 +                                                                                       0   400
*LAST    +                                                                                       0   400
            +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240
```

```
          run49

HISTOGRAM OF VARIABLE    2 tsvn
                                  SYMBOL   COUNT     MEAN     ST.DEV.
                                     X      400    9098.424   184.223
                          EACH SYMBOL REPRESENTS         3 OBSERVATIONS
INTERVAL                                                                                                FREQUENCY
NAME          15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240   INT. CUM.
            +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*8425.00 +                                                                                      0    0
*8500.00 +                                                                                      0    0
*8575.00 +                                                                                      1    1
*8650.00 +                                                                                      1    2
*8725.00 +XXX                                                                                   9   11
*8800.00 +XXXX                                                                                 13   24
*8875.00 +XXXXXX                                                                               18   42
*8950.00 +XXXXXXXXXXXXX                                                                        38   80
*9025.00 +XXXXXXXXXXXXXXXXXXXX                                                                 61  141
*9100.00 +XXXXXXXXXXXXXXXXXXXX                                                                 59  200
*9175.00 +XXXXXXXXXXXXXXXXXXXXXXX                                                              70  270
*9250.00 +XXXXXXXXXXXXXXXX                                                                     48  318
*9325.00 +XXXXXXXXXXXXX                                                                        40  358
*9400.00 +XXXXXXX                                                                              21  379
*9475.00 +XXXXX                                                                                14  393
*9550.00 +X                                                                                     4  397
*9625.00 +X                                                                                     2  399
*9700.00 +                                                                                      1  400
*9775.00 +                                                                                      0  400
*9850.00 +                                                                                      0  400
*9925.00 +                                                                                      0  400
*LAST    +                                                                                      0  400
            +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240
```

```
                  run49

HISTOGRAM OF VARIABLE     3 tsvh
                                         SYMBOL   COUNT     MEAN      ST.DEV.
                                            X      400    9493.891     162.906
                              EACH SYMBOL REPRESENTS        3 OBSERVATIONS
INTERVAL                                                                                          FREQUENCY
NAME          15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240   INT. CUM.
            +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*8725.00    +                                                                                     0    0
*8800.00    +                                                                                     0    0
*8875.00    +                                                                                     0    0
*8950.00    +                                                                                     0    0
*9025.00    +                                                                                     1    1
*9100.00    +                                                                                     0    1
*9175.00    +XXXX                                                                                12   13
*9250.00    +XXXXX                                                                               16   29
*9325.00    +XXXXXXXXXX                                                                          30   59
*9400.00    +XXXXXXXXXXXXXXXXXXX                                                                 58  117
*9475.00    +XXXXXXXXXXXXXXXXXXXXX                                                               64  181
*9550.00    +XXXXXXXXXXXXXXXXXXXXXXXX                                                            73  254
*9625.00    +XXXXXXXXXXXXXXXXXXXX                                                                61  315
*9700.00    +XXXXXXXXXXXXXXX                                                                     44  359
*9775.00    +XXXXXXXXX                                                                           27  386
*9850.00    +XXX                                                                                  8  394
*9925.00    +X                                                                                    3  397
*10000.0    +X                                                                                    3  400
*10075.0    +                                                                                     0  400
*10150.0    +                                                                                     0  400
*10225.0    +                                                                                     0  400
*LAST       +                                                                                     0  400
            +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240
```

```
              run50

HISTOGRAM OF VARIABLE     1 tsv!
                                  SYMBOL   COUNT      MEAN      ST.DEV.
                                    X       400     6423.168     473.840
                        EACH SYMBOL REPRESENTS          3 OBSERVATIONS
INTERVAL                                                                                                   FREQUENCY
NAME             15    30    45    60    75    90   105   120   135   150   165   180   195   210   225   240   INT. CUM.
           +-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
*5000.00   +                                                                                                  0    0
*5150.00   +                                                                                                  1    1
*5300.00   +X                                                                                                 2    3
*5450.00   +XX                                                                                                6    9
*5600.00   +XXXX                                                                                             13   22
*5750.00   +XXXXX                                                                                            15   37
*5900.00   +XXXX                                                                                             13   50
*6050.00   +XXXXXXXXXXXX                                                                                     37   87
*6200.00   +XXXXXXXXXXXXXX                                                                                   42  129
*6350.00   +XXXXXXXXXXXXXXXX                                                                                 47  176
*6500.00   +XXXXXXXXXXXXXXX                                                                                  46  222
*6650.00   +XXXXXXXXXXXXX                                                                                    38  260
*6800.00   +XXXXXXXXXXXXXXX                                                                                  46  306
*6950.00   +XXXXXXXXXXXXXXX                                                                                  44  350
*7100.00   +XXXXXXXXX                                                                                        27  377
*7250.00   +XXX                                                                                              10  387
*7400.00   +XXX                                                                                               9  396
*7550.00   +X                                                                                                 2  398
*7700.00   +                                                                                                  1  399
*7850.00   +                                                                                                  0  399
*8000.00   +                                                                                                  1  400
*LAST      +                                                                                                  0  400
           +-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
                 15    30    45    60    75    90   105   120   135   150   165   180   195   210   225   240
```

```
run50

HISTOGRAM OF VARIABLE     2 tsvn
                                   SYMBOL   COUNT      MEAN      ST.DEV.
                                     X       400     6868.333     469.786
                         EACH SYMBOL REPRESENTS          3 OBSERVATIONS
INTERVAL                                                                                    FREQUENCY
NAME          15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240  INT. CUM.
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*5450.00 +                                                                                   0    0
*5600.00 +X                                                                                  2    2
*5750.00 +                                                                                   1    3
*5900.00 +XX                                                                                 6    9
*6050.00 +XXXX                                                                              13   22
*6200.00 +XXXXX                                                                             16   38
*6350.00 +XXXX                                                                              13   51
*6500.00 +XXXXXXXXXXXX                                                                      36   87
*6650.00 +XXXXXXXXXXXXXX                                                                    42  129
*6800.00 +XXXXXXXXXXXXXX                                                                    41  170
*6950.00 +XXXXXXXXXXXXXXXXX                                                                 51  221
*7100.00 +XXXXXXXXXXXXXX                                                                    41  262
*7250.00 +XXXXXXXXXXXXXXXX                                                                  49  311
*7400.00 +XXXXXXXXXXXX                                                                      37  348
*7550.00 +XXXXXXXXXX                                                                        31  379
*7700.00 +XXX                                                                                9  388
*7850.00 +XXX                                                                                8  396
*8000.00 +X                                                                                  3  399
*8150.00 +                                                                                   0  399
*8300.00 +                                                                                   0  399
*8450.00 +                                                                                   1  400
*LAST    +                                                                                   0  400
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240
```

```
            run50

HISTOGRAM OF VARIABLE    3 tsvh
                                          SYMBOL   COUNT      MEAN       ST.DEV.
                                            X       400     7279.578      464.077
                                EACH SYMBOL REPRESENTS          3 OBSERVATIONS
INTERVAL                                                                                       FREQUENCY
NAME          15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240   INT. CUM.
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*5900.00 +                                                                                       0    0
*6050.00 +X                                                                                      2    2
*6200.00 +X                                                                                      2    4
*6350.00 +XX                                                                                     7   11
*6500.00 +XXXXX                                                                                 14   25
*6650.00 +XXXXX                                                                                 16   41
*6800.00 +XXXXX                                                                                 16   57
*6950.00 +XXXXXXXXXXXX                                                                          37   94
*7100.00 +XXXXXXXXXXXXXXX                                                                       45  139
*7250.00 +XXXXXXXXXXXXXX                                                                        42  181
*7400.00 +XXXXXXXXXXXXXXXXXX                                                                    53  234
*7550.00 +XXXXXXXXXXXX                                                                          37  271
*7700.00 +XXXXXXXXXXXXXXXXXX                                                                    53  324
*7850.00 +XXXXXXXXXXX                                                                           33  357
*8000.00 +XXXXXXXX                                                                              25  382
*8150.00 +XXX                                                                                   10  392
*8300.00 +XX                                                                                     5  397
*8450.00 +X                                                                                      2  399
*8600.00 +                                                                                       0  399
*8750.00 +                                                                                       0  359
*8900.00 +                                                                                       1  400
*LAST    +                                                                                       0  400
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240
```

```
                    run51

HISTOGRAM OF VARIABLE     1 tsv1
                                      SYMBOL   COUNT      MEAN      ST.DEV.
                                        X       400     4199.161     538.986
                            EACH SYMBOL REPRESENTS          3 OBSERVATIONS
INTERVAL                                                                                        FREQUENCY
NAME          15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240   INT.  CUM.
             +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*2300.00 +                                                                                      0     0
*2475.00 +                                                                                      0     0
*2650.00 +                                                                                      1     1
*2825.00 +                                                                                      1     2
*3000.00 +X                                                                                     2     4
*3175.00 +XX                                                                                    7    11
*3350.00 +XXX                                                                                  10    21
*3525.00 +XXXXXX                                                                               18    39
*3700.00 +XXXXXXXXX                                                                            28    67
*3875.00 +XXXXXXXXXXXXXXXX                                                                     49   116
*4050.00 +XXXXXXXXXXXXXX                                                                       42   158
*4225.00 +XXXXXXXXXXXXXXXXX                                                                    52   210
*4400.00 +XXXXXXXXXXXXXXXXX                                                                    52   262
*4575.00 +XXXXXXXXXXXXX                                                                        40   302
*4750.00 +XXXXXXXXXXX                                                                          33   335
*4925.00 +XXXXXXXX                                                                             25   360
*5100.00 +XXXXXX                                                                               18   378
*5275.00 +XXXX                                                                                 13   391
*5450.00 +XX                                                                                    6   397
*5625.00 +X                                                                                     3   400
*5800.00 +                                                                                      0   400
*LAST    +                                                                                      0   400
             +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240
```

```
            run51

HISTOGRAM OF VARIABLE    2 tsvn
                                    SYMBOL  COUNT     MEAN      ST.DEV.
                                      X      460    4627.875    539.358
                               EACH SYMBOL REPRESENTS          3 OBSERVATIONS
INTERVAL                                                                                          FREQUENCY
NAME            15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240   INT. CUM.
              +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*2650.00 +                                                                                        0    0
*2825.00 +                                                                                        0    0
*3000.00 +                                                                                        1    1
*3175.00 +                                                                                        1    2
*3350.00 +X                                                                                       2    4
*3525.00 +X                                                                                       3    7
*3700.00 +XXX                                                                                    10   17
*3875.00 +XXXXX                                                                                  14   31
*4050.00 +XXXXXXXX                                                                               23   54
*4225.00 +XXXXXXXXXXX                                                                            34   88
*4400.00 +XXXXXXXXXXXXXXXXXX                                                                     53  141
*4575.00 +XXXXXXXXXXXXX                                                                          40  181
*4750.00 +XXXXXXXXXXXXXXXXXXX                                                                    58  239
*4925.00 +XXXXXXXXXXXXXXXXX                                                                      50  289
*5100.00 +XXXXXXXXXXX                                                                            34  323
*5275.00 +XXXXXXXXX                                                                              26  349
*5450.00 +XXXXXXXX                                                                               23  372
*5625.00 +XXXX                                                                                   12  384
*5800.00 +XXX                                                                                    10  394
*5975.00 +XX                                                                                      5  399
*6150.00 +                                                                                        1  400
*LAST    +                                                                                        0  400
              +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240
```

run51

```
HISTOGRAM OF VARIABLE    3 tsvh
                                   SYMBOL  COUNT      MEAN      ST.DEV.
                                     X      400     5055.656    536.362
                           E.CH SYMBOL REPRESENTS         3 OBSERVATIONS
INTERVAL                                                                                  FREQUENCY
NAME          15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240  INT. CUM.
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*3175.00 +                                                                                  0    0
*3350.00 +                                                                                  0    0
*3525.00 +X                                                                                 2    2
*3700.00 +                                                                                  1    3
*3875.00 +X                                                                                 3    6
*4050.00 +XX                                                                                6   12
*4225.00 +XXXX                                                                             11   23
*4400.00 +XXXXXXX                                                                          22   45
*4575.00 +XXXXXXX                                                                          22   67
*4750.00 +XXXXXXXXXXXXXXXXX                                                                52  119
*4925.00 +XXXXXXXXXXXXXXXX                                                                 47  166
*5100.00 +XXXXXXXXXXXXXXXXX                                                                50  216
*5275.00 +XXXXXXXXXXXXXXXX                                                                 49  265
*5450.00 +XXXXXXXXXXXXXX                                                                   43  308
*5625.00 +XXXXXXXXXXXX                                                                     36  344
*5800.00 +XXXXXX                                                                           19  363
*5975.00 +XXXXX                                                                            15  378
*6150.00 +XXXXX                                                                            15  393
*6325.00 +X                                                                                 4  397
*6500.00 +X                                                                                 3  400
*6675.00 +                                                                                  0  400
*LAST    +                                                                                  0  400
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240
```

```
                run52

HISTOGRAM OF VARIABLE     1 tsv1
                                    SYMBOL   COUNT      MEAN      ST.DEV.
                                      X       400     9098.086    224.082
                           EACH SYMBOL REPRESENTS        3 OBSERVATIONS
INTERVAL                                                                                              FREQUENCY
NAME          15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240     INT. CUM.
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*8300.00   +                                                                                       0    0
*8375.00   +                                                                                       0    0
*8450.00   +                                                                                       0    0
*8525.00   +                                                                                       1    1
*8600.00   +XX                                                                                     7    8
*8675.00   +XXX                                                                                    9   17
*8750.00   +XXX                                                                                   10   27
*8825.00   +XXXXX                                                                                 14   41
*8900.00   +XXXXXXXXXX                                                                            30   71
*8975.00   +XXXXXXXXXXXXXXX                                                                       45  116
*9050.00   +XXXXXXXXXXXXXXXX                                                                      47  163
*9125.00   +XXXXXXXXXXXXXXXXX                                                                     52  215
*9200.00   +XXXXXXXXXXXXXXXXXXX                                                                   57  272
*9275.00   +XXXXXXXXXXXXXX                                                                        43  315
*9350.00   +XXXXXXXXXXXX                                                                          36  351
*9425.00   +XXXXXXXX                                                                              24  375
*9500.00   +XXXX                                                                                  12  387
*9575.00   +XX                                                                                     5  392
*9650.00   +X                                                                                      4  396
*9725.00   +X                                                                                      4  400
*9800.00   +                                                                                       0  400
*LAST      +                                                                                       0  400
           +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240
```

```
          run52

HISTOGRAM OF VARIABLE     2 tsvn
                                  SYMBOL  COUNT      MEAN      ST.DEV.
                                    X      400    9517.460     196.766
                          EACH SYMBOL REPRESENTS          3 OBSERVATIONS
                                                                                       FREQUENCY
INTERVAL                                                                               INT. CUM.
NAME           15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*8675.00 +                                                                                0    0
*8750.00 +                                                                                0    0
*8825.00 +                                                                                0    0
*8900.00 +                                                                                0    0
*8975.00 +                                                                                1    1
*9050.00 +X                                                                               3    4
*9125.00 +XXX                                                                             9   13
*9200.00 +XXXX                                                                           12   25
*9275.00 +XXXXX                                                                          16   41
*9350.00 +XXXXXXXXXXX                                                                    33   74
*9425.00 +XXXXXXXXXXXXXXXXXXXX                                                           59  133
*9500.00 +XXXXXXXXXXXXXXX                                                                45  178
*9575.00 +XXXXXXXXXXXXXXXXXXXXXX                                                         65  243
*9650.00 +XXXXXXXXXXXXXXXXXXX                                                            57  300
*9725.00 +XXXXXXXXXXXXXX                                                                 42  342
*9800.00 +XXXXXXXXXX                                                                     30  372
*9875.00 +XXXXXX                                                                         18  390
*9950.00 +X                                                                               3  393
*10025.0 +XX                                                                              6  399
*10100.0 +                                                                                1  400
*10175.0 +                                                                                0  400
*LAST    +                                                                                0  400
         +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
               15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240
```

```
          run52

HISTOGRAM OF VARIABLE    3 tsvh
                              SYMBOL   COUNT      MEAN       ST.DEV.
                                X       400     9882.267     176.211
                      EACH SYMBOL REPRESENTS          3 OBSERVATIONS
INTERVAL                                                                                      FREQUENCY
NAME          15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240   INT. CUM.
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*9050.00  +                                                                                    0    0
*9125.00  +                                                                                    0    0
*9200.00  +                                                                                    0    0
*9275.00  +                                                                                    0    0
*9350.00  +                                                                                    0    0
*9425.00  +                                                                                    1    1
*9500.00  +XX                                                                                  6    7
*9575.00  +XXXX                                                                               13   20
*9650.00  +XXXXXX                                                                             17   37
*9725.00  +XXXXXXXXXXX                                                                        33   70
*9800.00  +XXXXXXXXXXXXXXXXXXXXX                                                              62  132
*9875.00  +XXXXXXXXXXXXXXXXXXXX                                                               60  192
*9950.00  +XXXXXXXXXXXXXXXXXXXXXXXX                                                           71  263
*10025.0  +XXXXXXXXXXXXXXXXXXX                                                                56  319
*10100.0  +XXXXXXXXXXXXXX                                                                     42  361
*10175.0  +XXXXXXX                                                                            21  382
*10250.0  +XXX                                                                                10  392
*10325.0  +X                                                                                   4  396
*10400.0  +X                                                                                   4  400
*10475.0  +                                                                                    0  400
*10550.0  +                                                                                    0  400
*LAST     +                                                                                    0  400
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240
```

```
run53

HISTOGRAM OF VARIABLE     1 tsvl
                                   SYMBOL  COUNT      MEAN      ST.DEV.
                                     X      400     6672.546    515.576
                          EACH SYMBOL REPRESENTS          3 OBSERVATIONS
INTERVAL                                                                                                FREQUENCY
NAME           15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240  INT. CUM.
             +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*5000.00 +                                                                                      0    0
*5175.00 +                                                                                      0    0
*5350.00 +X                                                                                     2    2
*5525.00 +X                                                                                     2    4
*5700.00 +XXXX                                                                                 12   16
*5875.00 +XXXXXX                                                                               17   33
*6050.00 +XXXX                                                                                 12   45
*6225.00 +XXXXXXXXXX                                                                           31   76
*6400.00 +XXXXXXXXXXXXXX                                                                       43  119
*6575.00 +XXXXXXXXXXXXXXXXX                                                                    52  171
*6750.00 +XXXXXXXXXXXXXXXXX                                                                    50  221
*6925.00 +XXXXXXXXXXXXXX                                                                       41  262
*7100.00 +XXXXXXXXXXXXXXXXX                                                                    50  312
*7275.00 +XXXXXXXXXXXXX                                                                        40  352
*7450.00 +XXXXXXXXXX                                                                           30  382
*7625.00 +XXX                                                                                   8  390
*7800.00 +XX                                                                                    7  397
*7975.00 +X                                                                                     2  399
*8150.00 +                                                                                      0  399
*8325.00 +                                                                                      0  399
*8500.00 +                                                                                      1  400
*LAST    +                                                                                      0  400
             +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
               15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240
```

```
          run53

HISTOGRAM OF VARIABLE     2 tsvn
                                      SYMBOL   COUNT      MEAN      ST.DEV.
                                         X       400    7078.600    511.406
                               EACH SYMBOL REPRESENTS         3 OBSERVATIONS
INTERVAL                                                                                          FREQUENCY
NAME            15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240   INT. CUM.
               +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*5350.00 +                                                                                         0    0
*5525.00 +                                                                                         0    0
*5700.00 +X                                                                                        2    2
*5875.00 +                                                                                         1    3
*6050.00 +XXX                                                                                      8   11
*6225.00 +XXXXX                                                                                   15   26
*6400.00 +XXXXX                                                                                   16   42
*6575.00 +XXXXXX                                                                                  19   61
*6750.00 +XXXXXXXXXXXXX                                                                           40  101
*6925.00 +XXXXXXXXXXXXXXXXXX                                                                      54  155
*7100.00 +XXXXXXXXXXXXXXXX                                                                        47  202
*7275.00 +XXXXXXXXXXXXXXXXX                                                                       51  253
*7450.00 +XXXXXXXXXXXXXXX                                                                         45  298
*7625.00 +XXXXXXXXXXXXXXXX                                                                        47  345
*7800.00 +XXXXXXXXXXX                                                                             32  377
*7975.00 +XXXX                                                                                    11  388
*8150.00 +XXX                                                                                      8  396
*8325.00 +X                                                                                        3  399
*8500.00 +                                                                                         0  399
*8675.00 +                                                                                         0  399
*8850.00 +                                                                                         1  400
*LAST    +                                                                                         0  400
               +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240
```

```
              run53

HISTOGRAM OF VARIABLE    3 tsvh
                                      SYMBOL  COUNT      MEAN      ST.DEV.
                                        X      4ØØ     7456.636    5Ø6.Ø35
                              EACH SYMBOL REPRESENTS           3 OBSERVATIONS
INTERVAL                                                                                                      FREQUENCY
NAME            15   3Ø   45   6Ø   75   9Ø  1Ø5  12Ø  135  15Ø  165  18Ø  195  21Ø  225  24Ø   INT. CUM.
               +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*5875.ØØ +                                                                                          Ø    Ø
*6Ø5Ø.ØØ +                                                                                          1    1
*6225.ØØ +X                                                                                         2    3
*54ØØ.ØØ +XX                                                                                        5    8
*6575.ØØ +XXXXX                                                                                    14   22
*675Ø.ØØ +XXXXXX                                                                                   17   39
*6925.ØØ +XXXXXX                                                                                   17   56
*71ØØ.ØØ +XXXXXXXXXXXX                                                                             37   93
*7275.ØØ +XXXXXXXXXXXXXXXXX                                                                        52  145
*745Ø.ØØ +XXXXXXXXXXXXXXXX                                                                         48  193
*7625.ØØ +XXXXXXXXXXXXXXXXXXX                                                                      56  249
*78ØØ.ØØ +XXXXXXXXXXXXXX                                                                           42  291
*7975.ØØ +XXXXXXXXXXXXXXXXX                                                                        5Ø  341
*815Ø.ØØ +XXXXXXXXXX                                                                               31  372
*8325.ØØ +XXXXX                                                                                    16  388
*85ØØ.ØØ +XXX                                                                                       8  396
*8675.ØØ +X                                                                                         2  398
*885Ø.ØØ +                                                                                          1  399
*9Ø25.ØØ +                                                                                          Ø  399
*92ØØ.ØØ +                                                                                          1  4ØØ
*9375.ØØ +                                                                                          Ø  4ØØ
*LAST    +                                                                                          Ø  4ØØ
               +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                15   3Ø   45   6Ø   75   9Ø  1Ø5  12Ø  135  15Ø  165  18Ø  195  21Ø  225  24Ø
```

```
                run54

HISTOGRAM OF VARIABLE     1 tsv1
                                     SYMBOL   COUNT      MEAN      ST.DEV.
                                       X       400     4236.564     588.841
                           EACH SYMBOL REPRESENTS            3 OBSERVATIONS
INTERVAL                                                                                          FREQUENCY
NAME            15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240   INT. CUM.
              +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*2300.00 +                                                                                          0    0
*2475.00 +                                                                                          1    1
*2650.00 +                                                                                          1    2
*2825.00 +X                                                                                         2    4
*3000.00 +X                                                                                         3    7
*3175.00 +XXX                                                                                       8   15
*3350.00 +XXX                                                                                      10   25
*3525.00 +XXXXXX                                                                                   19   44
*3700.00 +XXXXXXXX                                                                                 24   68
*3875.00 +XXXXXXXXXXXXXX                                                                           43  111
*4050.00 +XXXXXXXXXXXXX                                                                            40  151
*4225.00 +XXXXXXXXXXXXXXXX                                                                         49  200
*4400.00 +XXXXXXXXXXXXXXXX                                                                         49  249
*4575.00 +XXXXXXXXXXXXXX                                                                           42  291
*4750.00 +XXXXXXXXXX                                                                               31  322
*4925.00 +XXXXXXXX                                                                                 23  345
*5100.00 +XXXXXXXX                                                                                 25  370
*5275.00 +XXXX                                                                                     11  381
*5450.00 +XXXX                                                                                     12  393
*5625.00 +X                                                                                         4  397
*5800.00 +X                                                                                         3  400
*LAST    +                                                                                          0  400
              +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
                15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240
```

```
                run54

HISTOGRAM OF VARIABLE      2 tsvn
                                    SYMBOL   COUNT      MEAN      ST.DEV.
                                       X      400    4629.098     588.532
                         EACH SYMBOL REPRESENTS        3 OBSERVATIONS
INTERVAL                                                                                        FREQUENCY
NAME          15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240  INT. CUM.
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*2650.00 +                                                                                    0    0
*2825.00 +                                                                                    1    1
*3000.00 +                                                                                    1    2
*3175.00 +                                                                                    1    3
*3350.00 +X                                                                                   3    6
*3525.00 +XX                                                                                  5   11
*3700.00 +XXXX                                                                               11   22
*3875.00 +XXXXX                                                                              16   38
*4050.00 +XXXXXXXX                                                                           25   63
*4225.00 +XXXXXXXXXXXXX                                                                      39  102
*4400.00 +XXXXXXXXXXXXXX                                                                     43  145
*4575.00 +XXXXXXXXXXXXX                                                                      39  184
*4750.00 +XXXXXXXXXXXXXXXXX                                                                  51  235
*4925.00 +XXXXXXXXXXXXXXXXX                                                                  50  285
*5100.00 +XXXXXXXXXX                                                                         28  313
*5275.00 +XXXXXXXXXX                                                                         29  342
*5450.00 +XXXXXXX                                                                            21  363
*5625.00 +XXXXX                                                                              16  379
*5800.00 +XXXX                                                                               11  390
*5975.00 +XX                                                                                  7  397
*6150.00 +X                                                                                   3  400
*LAST    +                                                                                    0  400
          +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240
```

```
                    run54

HISTOGRAM OF VARIABLE     3 tsvh
                                      SYMBOL  COUNT      MEAN      ST.DEV.
                                        X      400     5620.678     585.859
                               EACH SYMBOL REPRESENTS          3 OBSERVATIONS
INTERVAL                                                                                        FREQUENCY
NAME          15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240   INT. CUM.
            +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
*3175.00 +                                                                                         0    0
*3350.00 +X                                                                                        2    2
*3525.00 +                                                                                         1    3
*3700.00 +X                                                                                        3    6
*3875.00 +X                                                                                        4   10
*4050.00 +XXX                                                                                      9   19
*4225.00 +XXXXX                                                                                   15   34
*4400.00 +XXXXXXX                                                                                 22   56
*4575.00 +XXXXXXXXXXX                                                                             32   88
*4750.00 +XXXXXXXXXXXXXXXX                                                                        49  137
*4925.00 +XXXXXXXXXXXXX                                                                           38  175
*5100.00 +XXXXXXXXXXXXXXXXX                                                                       52  227
*5275.00 +XXXXXXXXXXXXXX                                                                          43  270
*5450.00 +XXXXXXXXXXXX                                                                            37  307
*5625.00 +XXXXXXXXXX                                                                              31  338
*5800.00 +XXXXXXXX                                                                                23  361
*5975.00 +XXXXX                                                                                   14  375
*6150.00 +XXXX                                                                                    12  387
*6325.00 +XXX                                                                                     10  397
*6500.00 +X                                                                                        2  399
*6675.00 +                                                                                         1  400
*LAST    +                                                                                         0  400
            +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
              15   30   45   60   75   90  105  120  135  150  165  180  195  210  225  240
```

Appendix E: Overlap Percentages for Variance Distributions

The percentages in the table represent the percent of the observations that were above the percentile for the 'low' distribution and the percent of the observations that were below the percentile for the 'high' distribution.

LOW OBS RUN#										HI OBS RUN#									
RUN	1	2	3	4	5	6	7	8	9	RUN	1	2	3	4	5	6	7	8	9
%										%									
05	52	88	90	58	88	92	64	90	92	95	50	74	88	48	72	88	58	80	90
10	52	84	78	52	84	80	60	86	82	90	44	66	88	48	72	88	52	76	88
15	32	74	66	46	76	64	50	78	72	85	32	64	74	46	70	80	48	72	82

RUN	10	11	12	13	14	15	16	17	18	RUN	10	11	12	13	14	15	16	17	18
%										%									
05	74	92	92	76	92	92	82	92	92	95	78	84	90	72	82	92	78	84	94
10	66	88	88	72	88	88	74	88	86	90	66	78	88	72	82	88	76	80	88
15	58	84	78	62	82	80	66	82	80	85	66	72	82	64	78	82	72	80	82

RUN	19	20	21	22	23	24	25	26	27	RUN	19	20	21	22	23	24	25	26	27
%										%									
05	3	61	69	7	73	76	16	79	79	95	3	57	72	10	65	77	17	71	80
10	2	43	56	4	54	66	7	53	73	90	0	47	53	4	57	63	10	60	70
15	2	30	43	3	44	59	6	50	63	85	0	33	41	1	51	54	4	53	62

LOW OBS
RUN#

RUN %	28	29	30	31	32	33	34	35	36
05	38	84	83	51	87	88	60	88	88
10	31	70	76	43	77	78	49	80	80
15	23	60	68	35	66	75	43	68	76

RUN %	37	38	39	40	41	42	43	44	45
05	0	31	36	0	51	55	2	61	65
10	0	19	24	0	39	38	1	45	48
15	0	7	18	0	22	28	0	31	37

RUN %	46	47	48	49	50	51	52	53	54
05	14	69	71	25	80	81	37	86	85
10	6	57	59	14	65	67	22	72	72
15	4	42	48	9	52	59	17	57	63

HI OBS
RUN#

RUN %	28	29	30	31	32	33	34	35	36
95	47	80	85	51	86	90	58	88	90
90	32	69	76	41	73	77	46	78	79
85	25	58	69	31	62	74	36	67	76

RUN %	37	38	39	40	41	42	43	44	45
95	0	28	42	0	41	60	2	51	68
90	0	20	28	0	33	43	0	42	53
85	0	3	18	0	27	35	0	34	41

RUN %	46	47	48	49	50	51	52	53	54
95	14	61	77	30	69	83	41	75	86
90	8	54	63	16	63	72	25	66	76
85	5	47	55	10	55	62	17	59	64

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Abstract

This ~~research~~ thesis project developed a cost-risk assessment method that incorporated the effects of cost dependency between components in a system. The method uses program personnel's subjective assessments of component dependency as inputs. A simulation model was developed and employed to test the method under various levels of component dependence strength and direction, estimation error, and system size.

The analysis was accomplished by performing sensitivity analysis on the predictive capabilities of the cost-risk assessing method. Results indicate that the model has strong predictive capability when component size is small and when the direction of the component dependencies is mixed. It was also determined that the use of component dependency assessments produced more realistic total system cost variances than those produced under the assumption of component cost independence.